

THE COAST ARTILLERY JOURNAL

(PUBLISHED AS THE JOURNAL UNITED STATES ARTILLERY FROM 1892 TO JUNE, 1922)

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FOR

WHOLE No. 220

DECEMBER, 1924

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Published monthly under the supervision of the Commandant, Coast Artillery School, by direction of the Chief of Coast Artillery, for the information of the Coast Artillery personnel of the Regular Army, Organized Reserve and National Guard.

Entered at the Post Office at Fortress Monroe, Va., as second class matter. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized May 8, 1920. All subscriptions payable in advance.

SUBSCRIPTION RATES

Yearly Domestic	\$8.00
Canada	3.25
Countries in the postal union	3.50
Single Numbers:	
Domestic50
Foreign60

Remittances, articles intended for publication, and communications relating to the management should be addressed *COAST ARTILLERY JOURNAL*, Fort Monroe, Virginia.

Authors alone are responsible for statements in contributed articles.

It is earnestly requested that prompt information be given of changes of address, or failure to receive THE JOURNAL. Both old and new addresses should be given.

MAJOR J. A. GREEN, C. A. C. Manager and Editor
CAPTAIN D. L. DUTTON, C. A. C. Assistant Editor

Printed by HOUSTON PRINTING AND PUBLISHING HOUSE, Hampton, Va.

Report Documentation Page			Form Approved OMB No. 0704-0188	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE DEC 1924	2. REPORT TYPE	3. DATES COVERED 00-00-1924 to 00-00-1924		
4. TITLE AND SUBTITLE The Coast Artillery Journal. Volume 61, Number 6, December 1924			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)			5d. PROJECT NUMBER	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Coast Artillery Training Center,Coast Artillery Journal,Fort Monroe,VA,23651			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 125
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	19a. NAME OF RESPONSIBLE PERSON	



BRIGADIER GENERAL ROBERT E. CALLAN

*Successor to Major General William R. Smith as Commandant of the
Coast Artillery School and Commanding General of the Third Coast
Artillery District*

The Coast Artillery Journal

Vol. 61 No. 6 DECEMBER, 1924 Whole No. 220

A Reunited Artillery

By BRIGADIER GENERAL JOHNSON HAGOOD, U. S. Army

EDITOR'S NOTE: This article was written in 1920, but not submitted for publication. It is now submitted by General Hagood in view of the recent discussion of the subject in the press.

AFTER living together happily for more than a hundred years the Coast and Field Artillery were separated by a special Act of Congress dated January 25, 1907, and their respective functions were defined as follows:

Sec. 3. The Coast Artillery is the Artillery charged with the care and use of the fixed and movable elements of land and coast fortifications, including the submarine mine and torpedo defenses.

Sec. 4. The Field Artillery is the Artillery which accompanies an army in the field, and includes light artillery, horse artillery, siege artillery, and mountain artillery.

Major General Arthur Murray—one time Chief of both Coast and Field Artillery—in a report to the Secretary of War dated December 10, 1915, said:

From my personal knowledge, in each instance, I can state that without the able work of Major Johnson Hagood, Coast Artillery Corps, before committees of Congress, and his personal influence with individual members of Congress, and the confidence these committees and members of Congress had in his integrity, neither the Artillery Increase Bill of 1907, the Army Pay Bill of 1908, nor the Extra Officers Bill of 1911, would have been enacted.

If the writer is to be given the credit or the blame for having caused the separation of the Coast and Field Artillery, it is hoped

that that fact will add something to the arguments about to be made for their being reunited. General Murray's fine compliment is only an instance of his characteristic generosity in giving credit to his staff. It goes without saying that it was he himself who was largely responsible for the artillery legislation of 1907. However, more of that later.

In the matter of a reunion of the Artillery, there are two schools of thought. As a general proposition, Coast Artillery officers are in favor of it and Field Artillery officers are opposed to it. There is a third school whom it is believed have not given the matter much detailed study. These would turn what they call harbor defenses over to the Navy. Our friends the Marines would probably not object to this, and they would handle it as they have always handled everything—with great credit to themselves and to the country.

It is a principle of parliamentary law that the motion to reconsider must be made by one who voted with the majority. In presenting the arguments in this paper, it is therefore my purpose to show at the outset that Coast Artillery officers were primarily responsible for the separation, and that for this reason if for no other the voice of Coast Artillery officers should be heard in favor of a reunion. In other words, if the Field Artillery had succeeded in cutting itself off from the Coast Artillery; had set up an organization of its own, and had obtained a position of advantage, it would not be with good grace that the Coast Artillery could demand a reconsideration, as the question would have been already settled to their own disadvantage.

But let us see what really happened.

An attempt will be made to indicate who started the trouble, what the reasons were that led to the separation, and how these reasons do not apply to the existing situation.

The first agitation which led to the final separation of the Coast and Field Artillery seems to be an article in the *ARTILLERY JOURNAL* of January, 1892, by Lieutenant W. A. Simpson, 2nd Artillery, wherein he concludes a long argument for the reorganization and improvement of the coast defenses as follows:

The light and horse artillery should have a distinct organization of their own. There is much more similarity in the functions of mounted artillery and cavalry, than between mounted and seacoast artillery. Their kinds of work and spheres of action are entirely different. If we had a modern defensive system and a modern armament, with all its expensive and complicated accompaniments, any officer would have all the work he needed to perfect himself in their use, and having attained some

degree of proficiency, it would be folly to detach him and send him for a tour of duty with a light battery, or vice versa.

This is a very large subject and cannot be thoroughly treated in an essay. I hope this paper, though, will have some effect in turning the attention of artillery officers to the subject, and in helping to convince them that what we want is a corps organization with a chief of artillery, and a permanent divorce of the personnel of seacoast from field and horse artillery.

Following the publication of Lieutenant Simpson's article, and up to 1901 we find a continuous agitation for an increase and reorganization of the Artillery. All of it was based primarily upon the necessity for a stronger system of coast defense, and the officers behind it—with the exception of the Assistant Secretary of War, Colonel William Carey Sanger—were all Coast Artillery officers. They included Simpson—now Major and A. A. G.—Captain C. de W. Wilcox, Lieutenant H. W. Whitney, Major J. P. Storey, and others.

Such prominent officers of the day as Lieutenant General Miles, commanding the Army, Lieutenant General Schofield, who had commanded the Army and had subsequently served as Secretary of War, Brigadier General J. C. Breckenridge, Inspector General of the Army, and a great number of the older Coast Artillery colonels opposed the corps organization in hearings before Congress, and advocated the organization of the Artillery into regiments, some heavy and some light. But the corps organization prevailed, with 126 batteries of heavy artillery and 30 batteries of field artillery—Act of February 2, 1901.

There the matter stood until May 27, 1904, when Major G. F. E. Harrison, a Coast Artillery officer detailed in the General Staff, initiated the legislation that finally resulted in the Act of January 25, 1907.

This was started by a letter written by him pointing out the deficiencies of the submarine mine defense. His letter resulted in a number of schemes being proposed by the contending forces in the War Department, and finally the President, Mr. Roosevelt, took a hand by addressing the following memorandum to the Secretary of War:

White House,
Washington,
March 13, 1905.

To the Secretary of War:

The proper organization and training of the artillery arm are so important to secure our national defense that I desire the Chief of Artillery may submit to the General Staff on or before June 30th next, recommendations on the following subjects:

1. The separation of the coast and field artillery; and if recommended, the best way to accomplish it.
2. The increase, if any, necessary in the personnel of the coast artillery, the organization it should have, and the inducements that should be given to retain the technically skilled enlisted men in the artillery service.
3. The organization the field artillery should have to prepare it for war and the increase, if any, that should be made in its personnel.
4. In what tactical units should field artillery be assembled for station in order to better train it in time of peace for war?
5. At which military reservations in our country can field artillery best have practice under conditions akin to those of active service and which of these are recommended as stations for field artillery?
6. Should examination for promotion of officers in the artillery include all grades?
7. What examination should be given to candidates for appointment as second lieutenants of artillery in order to insure their qualification for that branch of the service?
8. What is the cost of completing the entire torpedo defense of the United States including the accessories of such defense, and what personnel does it require to man it?
9. Is the present appropriation for target practice sufficient to qualify skilled gunners in both branches of the artillery corps?

I wish, if possible, the report of the General Staff, including a draft of the legislation recommended, to be in the hands of the Secretary of War for his consideration by September 1, 1905.

If the policy recommended for artillery garrisons requires an increase of shelter the Quartermaster General should include the necessary estimates for the coming year so that supplementary estimates may be avoided.

THEODORE ROOSEVELT.

It was generally believed at the time that this letter had been drafted by Major Harrison himself and had been given to Mr. Roosevelt by Captain Dan T. Moore, a Field Artillery officer on duty in the office of the Chief of Artillery, and aide-de-camp to the President.

This letter resulted in a number of bills being drawn by a General Staff committee of which Captain Peyton C. March was the Field Artillery member. The final draft, however, was made in the office of the Chief of Artillery, at that time General S. M. Mills.

It was here that the writer was brought into the matter. He had nothing to do with drafting the legislation, but was in charge of its enactment. He arranged for the hearings, assisted the clerks of the House and Senate military committees in drafting the committee reports, arranged for the bill to be brought up under a Suspension of the Rules, and had the pleasure of seeing it passed by both House and Senate within 40 minutes, without a dissenting vote on either side.

The first hearing was by Harrison, who had become a lieutenant colonel, and was acting as Chief of Artillery, May 22, 1906. This is all that was said during that hearing about the question of separation:

The Chairman—Why is it necessary to separate the artillery? Why cannot you have the whole artillery under one head as it is now, and provide for the increase and the increased pay? What is the reason for separating the artillery into two classes?

Colonel Harrison—The reason for that is technical. They have no relation to each other. In one case the guns are guns of position. In the other case the guns are part of the mobile army. The conditions, the training, the nature of the work to be done by each is radically different from the other. Of course, they are mutually associated to the extent that they both use what might be called relatively high-power guns. The field gun is a high-power gun in a way, but after all it is a small arm compared to the guns emplaced in the coast defenses. Of course, there can be and there are lieutenants who are interchanged, and the lieutenants are delighted to have the chance to serve with those field batteries, even though it is for three years, but the great trouble is, the captains remain with the field batteries. When we get a first-class captain with a field battery we leave him; we do not like to change him until he gets his promotion. When, however, he gets his promotion to major, the vacancy in all likelihood will be in the Coast Artillery, and we have to take a first-class light battery man and make of him a very poor and indifferent field officer of Coast Artillery. If the two were separate and the promotion were kept within the limits of each organization, that thing would not happen.

The Chairman—But they both deal with high-power guns. I do not see why a man who is a good artilleryman cannot serve with either branch, particularly if this idea of all-around soldiers which we have heard so much about is any good. In other words, if a field officer of a field battery knows something about artillery, naturally you could not put him in the line of cavalry or infantry, because they are not studying this line of work. I can understand that, but I have never been able to understand why the corps of artillery, with accomplished artillerymen, would not accomplish better results than if you divorced them and they had no interchangeability at all.

Colonel Harrison—It is on the principle of "jack-of-all-trades and master of none."

The Chairman—This is not "all trades"; it is just one trade in two branches.

Colonel Harrison—We have had a great deal of difficulty. For instance, at this time quite a number of field officers have been sent down to Fort Monroe for three months because they are up for examination for promotion to the next grade. They have been removed for years from the Coast Artillery, which has been making in the meantime immense strides in the introduction of all this complicated machinery and accessories, and when they come up for examination they are absolutely unfit to pass the examination now required under the law of an artillery officer. They are examined in both Coast and Field Artillery

work, and it is necessary to take the officers for three or four months and send them down to Fort Monroe in order to let them undergo a system of cramming for their examination.

The next hearing was on January 8th. At this hearing was the Secretary of War, Mr. Taft; the Chief of Staff, General J. Franklin Bell; the Chief of Artillery, General Arthur Murray; and myself. In explaining the separation features of the bill, Mr. Taft said:

Secretary Taft—Its main feature, with respect to the change of organization, is that it separates the Coast Artillery from the Field Artillery. Under modern conditions the Coast Artillery and the Field Artillery ought not to be united. The Field Artillery is part of the mobile army, composed of the light artillery, siege guns, and mountain batteries, which are supposed to move with infantry and cavalry. The Coast Artillery in some countries—like France—is really made part of the marine force, but not all of it. There are modern coast batteries in France that are manned by sailors.

The practical difficulties with reference to the two, or the maintenance of the two together, are really very great. In the matter of the examination of officers, for instance, the Coast Artillery requires a different kind of preparation from that of the Field Artillery. The truth is that there is quite as great a difference between the large guns of the Coast Artillery and the lighter guns of the Field Artillery as there is between the lighter guns of the Field Artillery and the Springfield rifles of the Infantry or the Cavalry.

The Field Artillery has become more and more important in the make-up of an army. The experiences in the Russian-Japanese War, and the possibility of using a regiment or a brigade of artillery in such a way as to have what they call indirect fire, making it very destructive, and putting it in such a situation as to avoid attack, make the development of that branch exceedingly important.

The Chairman—I suppose if I get an idea in my head it is a hard thing to get it out—I do not get enough of them to crowd each other out—but coming back to this matter of separation, the whole theory of our legislation since the Spanish War has been to make all of our officers trained men in as large a degree as we could. The detail system was to give them training in different lines so that they would be valuable wherever you put them. The Coast and Field Artillery are separate services, although nearer alike than any other two services, and if you could separate a regimental organization—and you practically have a regimental organization now—by making them by Executive order, we should, I imagine, by law provide for at least six regiments of them.

Secretary Taft—The truth is, if you will allow me to say so, that the subjects on which the officers are examined—and that, after all, determines what they ought to know—are very different in some important branches, such as the Coast Artillery, the light artillery, and the Field Artillery, and it is really not fair to a man who is fitted for the light artillery, and who is devoting his whole attention to acquiring a knowledge of that branch of the service—and there are no officers in the Army

who are more enthusiastic than the officers of the Field Artillery—to compel him to go down to Fortress Monroe and sit down for six months and cram up on a lot of subjects that he does not need as a field officer, merely in order to get promoted. It seems to me it is a waste of effort.

The Chairman—What I was getting at is why the light artillery—which is part of the mobile army, with the new arrangements of fire control, range firing, and all that adopted for the Field Artillery, as well as for the other—is not in point of detail the same.

Secretary Taft—It is something of the same, but if you will examine the subject of the examination you will find that they are quite different. The Coast Artillery ought to be made familiar with torpedo and submarine work, with which the Field Artillery has nothing whatever to do.

The Chairman—But as to the guns, the fire control, the calculation as to the angle that should be mapped out, it is pretty near the same in detail?

Secretary Taft—Yes, sir. I suppose they are rather more profound, if I may use that expression, in the Coast Artillery than they are in the Field Artillery with respect to such matters. Then, on the other hand, you ought to consider, it seems to me, that these field artillermen are cavalrymen in a sense. They have to learn—and it is a very technical subject—the drill of a battery of Field Artillery, and why should the coast artillermen be subjected to an examination on equitation or in a drill that is required with a light gun?

As might be expected, the Secretary of War and the Chief of Staff did most of the talking at this hearing, especially as it drifted into a discussion of brigade posts, but General Murray, anticipating this situation, had prepared a very complete statement in explanation of the bill. This had been printed in advance and was handed by him to the committee when he found that he would not have time to make an oral explanation. In it he said:

Having indicated the changes that the bill would make in the organization of the Artillery, I will consider briefly the reasons for each.

SEPARATION OF THE COAST AND FIELD ARTILLERY

It is a sound military principle that only such arms of the service as have a fighting or tactical relation with each other should be combined for organization purposes. The Coast Artillery, organized solely for the proper handling of the two correlative elements of harbor defense—heavy guns in fixed emplacements and submarine mines fixed in position in channels to be defended—constitutes in reality a passive defensive force which has no tactical relation whatever with the active forces of infantry, cavalry, or Field Artillery, the three fighting elements of a mobile army. In all mobile armies there is a definite ratio between the three fighting elements whenever these are combined in organizations for tactical purposes, the size of the organization or of the mobile army determining the amount and organization of its Field Artillery. The Coast Artillery, constituting the defense of harbors against an enemy's fleet, not only has no technical relation with any of the fighting

elements of a mobile army; but there is no definite ratio between the two fighting elements, heavy guns and mines. The number and character of the guns and the number of mines vary with each harbor to be defended. The combination of the Coast and Field Artillery into a corps as is now done is not only unsound as a military principle, but the frequent interchange of officers between these tactically unrelated arms is considered to be clearly detrimental to the efficiency of both.

On this question the General Staff as a whole reported:

"This separation is one of the most important and necessary parts of any scheme looking to the improvement of the present conditions existing in the Artillery Corps."

The separation was further recommended by a special committee of the General Staff, consisting of two infantry, two cavalry, and one artillery officers, appointed to consider the special needs of the artillery, and General Chaffee, as Chief of Staff, in approving the report of this committee, stated:

"I concur with the special committee that the Field Artillery should be given a regimental organization, and that it be completely separated from the Coast Artillery and become a distinct arm of the service in every respect."

The necessity for this separation is self-evident to anyone conversant with the duties of the two arms and with the difficulties connected with the administration of the two when combined as at present.

The next hearing was by myself, January 11, 1907; it lasted two days. The first day was a very informal conference, with no stenographer present, and was simply an effort on the part of the members of the committee to unravel certain features of the bill they did not understand. The second day they brought in a stenographer, and the hearing was subsequently printed, but it did not include the reasons given by me for the separation. It did, however, include several pages in explanation of the details of the proposed Field Artillery organization which is of no consequence in connection with this article.

In the Senate report on the bill the reason given for the separation was as follows:

Another difficulty about the artillery which the bill proposes to remedy is the fact that we have united in one corps two branches of the army service which, under modern conditions, under the lessons of modern warfare, are as distinct as cavalry and infantry. They should be separated. The reason is technical. They have no relation to each other. In one case the guns are of position. In the other case the guns are part of the mobile army. The conditions, the training, the nature of the work to be done by each is radically different from the other. In one case the guns are guns of position. In the other case the both use what might be called relatively high-power guns. The field gun is a high-power gun in a way, but after all it is a small arm compared to the guns emplaced in the coast defenses. In the Russian and Japa-

nese War, one of the great features of the campaign was the massing of field batteries into regiments and brigades for the purpose of driving troops of the enemy out of entrenchments and cooperating even more, very much more, with the infantry than ever have been done before. It was not an uncommon thing in the Japanese war for brigades of field artillery to have the fire of their batteries massed on one point, aimed and fired by officers and men who saw no mark, but who were directed by the colonel or the general in charge of the tactical combination by electrically communicated orders how to aim their guns in order that the explosives which were sent from those guns should explode in and over entrenchments entirely beyond the vision of the retired and concealed brigades. That makes the regimental and brigade formation of the field artillery most important.—*59th Congress, 1st Session; Senate Report No. 4298.*

These reasons had been extracted from the General Staff report on the bill and given to the committee by me.

The House report on the bill was simply an explanation of its provisions and gave no reasons why the separation should be made.

SUMMARY

By an examination of the above quotations and a number of other contemporaneous extracts from Service Journals, annual reports, etc., which have been omitted from this article, we see that the reasons which led to the separation of the Coast and Field Artillery may be summarized as follows:

First.—A number of distinguished authorities said it should be done, without giving any reasons.

Second.—There was no tactical relation between the horse drawn artillery that accompanied an army in the field and the fixed fortifications of the coast defenses.

Third.—It was not fair to require Coast Artillery officers to learn, and to pass examinations upon, methods of the mobile army, and vice versa for Field Artillery officers.

Fourth.—It was not practicable to have Coast Artillery officers and Field Artillery officers in the same line of promotion.

Fifth.—It was necessary to organize the Field Artillery into regiments and brigades, and this did not fit in well with the corps organization of the Coast Artillery.

Sixth.—The strongest and most logical arguments were presented by General Arthur Murray, who proposed to separate the two arms along the line of their separate functions in time of war.

THE PRESENT SITUATION

Let us see now to what extent these several reasons apply to the present situation.

First.—If the question were to be decided upon a matter of opinion there are more expert witnesses today that would testify in favor of reuniting the artillery than would testify against it.

Second.—The horse is no longer the main idea of the Field Artillery. The model field artilleryman is no longer the man who can execute a counter march at a gallop without knocking down the tent pins. The Coast Artillery and the Field Artillery now meet upon the common ground of the tractor, and the line of cleavage is between the 155-mm. long and the 155-mm. short.* The Coast Artillery, in addition to the fixed guns and submarine mines is now assigned to antiaircraft guns, trench mortars, all motorized artillery of 6-inch long and above and to all railway artillery. The Field Artillery is the divisional artillery and the Coast Artillery is the corps and army artillery. * Both belong to the mobile army, and both belong to the system of coast defense.

It might be said that if the Coast Artillery would give up these mobile army functions, and would turn over to the Field Artillery everything except the fixed guns and submarine mines the line of cleavage would be as clear as it was heretofore, but this is not true. This would require the Field Artillery to take over some of the railway artillery and we would have two separate branches of the Service armed with the same weapon—say 14-inch guns on railway mounts—one to strike the enemy on the water and the other to strike him when he puts his foot on shore. Present designs of railway artillery are for use against either moving targets on the water or fixed targets on the land. The German long range gun was on a “railway mount,” while some of the French 75’s on the western front were to all intents and purposes in fixed emplacements. So also were some of the machine gun nests.

Third.—In the scheme of preparing the country against a great war the peace-time regular officer must be prepared to exercise in time of war higher command in any arm where his services are most needed. During the World War the Coast Artillery sent to France a greater percentage of officers than did any other arm. These officers served with “The Mobile Army” and they served with every branch and in almost every capacity from corps commander down. A Coast Artillery officer is the only one in the army to hold all of the three highest American decorations—The Medal of Honor, the Distinguished Service Cross and Distinguished Service Medal. This officer had the unusual distinction of serving in France

*This line of cleavage has since been wiped out; both arms now have G. P. F.’s, as well as 8-inch and 240-mm. Howitzers. Of the movable guns, Railway Artillery and Antiaircraft only remain exclusively with the Coast Artillery. The Field Artillery has all Corps and Army Artillery except Antiaircraft. J. H. 1924.

as Chief of Staff of a division, as a Field Artillery brigade commander, and as an Infantry brigade commander—all with great credit. He got his Medal of Honor in the Philippines while serving with the Signal Corps.

The methods of the Field Artillery in France conformed much more closely to the old Coast Artillery methods than to the old Field Artillery methods. The fundamental principles of artillery fire taught in the schools of the two arms today are the same, as are also some of the details of execution. There is practically no officer now in the Coast Artillery of the grade of captain and above who was not taught the technique of the Field Artillery during the great war, and a great many of them, including the writer,* put this into practical execution by actual service with mobile artillery commands in the A. E. F.

On the other hand, some years ago when there was a little war scare in the Philippine Islands the Field Artillery was rushed into the seacoast fortifications at Corregidor Island.

In this matter Governor John A. T. Hull, of Iowa, Chairman of the House Committee on Military Affairs seems to have had more foresight than did some of the expert witnesses who testified before his committee.

Fourth.—All officers, including the Coast and Field Artillery, are now on one list for promotion, and are by law eligible for assignment to duty with any arm of the service. In order to accomplish the combination, therefore, the only thing that remains to be done is to combine the office of Chief of Field Artillery with that of Chief of Coast Artillery.

Fifth.—There is a strong feeling in the Coast Artillery that it should go back to the old regimental organization for the fixed defenses.† The French, who had a corps organization for their Artillery Lourde, changed back to a regimental organization during the progress of the war. We already have coast artillery regiments and brigades for the tractor-drawn and for the railway artillery. Some of this of the present writing is assigned exclusively to the mobile army, and its relation to the coast defenses is the same as that of any other mobile army units. The combination into one corps of all artillery would in no wise handicap the organization of the so-called Field Artillery into units best suited to its operation.

Sixth.—Now as to General Murray's very able presentation of the argument along functional lines. It has been shown in *Third*

*He since commanded a Field Artillery Brigade for two years in the Philippines.
J. H. 1924.

†This has since been accomplished. J. H. 1924.

above that a line of demarkation can no longer be drawn between the artillery of position for use against naval targets on the one hand and artillery of movement for use against land targets on the other. Just now the line is drawn between the divisional artillery on the one hand and the army and corps artillery on the other.* It is hard to see how anyone could defend a system by which officers of one branch of the army are trained for one of these purposes and officers of another branch are trained for the other. In effect this would mean that the Field Artillery was subordinate to the Coast Artillery. It would be like saying that the Infantry training should stop with the school of the battalion while the Cavalry training should take care of the regiment and of the brigade. The commander of the corps and army artillery, a coast artilleryman, would be chief of corps artillery and army artillery, respectively.*

Artillery is all artillery now and one cannot make fine distinctions between calibres or measure it out between the two services by the length of the 6-inch gun.

No one can tell what the future holds but unless experience is a false prophet all of our present artillery models and methods are on the rapid road to junk. The two branches of the artillery should be reunited and the best talent of both arms combined in solving the difficult military problems of the future. Many will agree with me that the most important and the most difficult of these lie entirely outside of the ordinary peace time training and administration of the regular army.

*This distinction has since been wiped out. J. H. 1924.

Annual Report of the Chief of Coast Artillery, 1924

September 8, 1924

Sir: I submit herewith my Annual Report as Chief of Coast Artillery.

PERSONNEL

ENLISTED STRENGTH

The enlisted strength allotted to the Coast Artillery Corps during the past year was 12,026, the same as during the previous year.

I invite attention to the remarks made on this subject on pages 4 to 6 inclusive, of my last annual report dated September 14, 1923, especially to the following extracts therefrom:

The present allotted strength of the Coast Artillery Corps is less than it has been at any time since 1901, although the present strength of the Regular Army is greater than it has been at any time during that period except during and immediately after the World War.

I feel it my duty to urge strongly that careful attention be given to this condition, which leaves many of our fortified harbors practically without any protection whatever, and none of them—even the most important—with anything like an adequate protection in an emergency.

At the time that report was submitted, it was my opinion that the conditions, as reported therein, were deplorable. This view I still hold. A year has passed, however, and no improvement has been brought about in the conditions reported.

The following are extracts from the Annual Report of the Chief of Coast Artillery dated October 2, 1915:

The Congress of the United States has appropriated \$175,000,000 in the installation of our present system of coast defenses. All approved projects as recommended by the Endicott and the National Coast Defense Boards are now practically completed. While certain additional fortifications are planned, and certain modifications of old projects now seem advisable, and while some old batteries may now be abandoned as a result of the evolution of conditions of naval attack during the past 20 years, it may be said, in so far as materiel is concerned, that the United States possesses today the most formidable system of coast defenses in the world.

Unfortunately, however, in connection with the installation of this coast defense equipment, there has been no parallel attempt by legislation to provide for manning it, and until such provision be made, our coast defenses cannot be considered as adequate.

In 1908 the Secretary of War approved a policy as to the personnel needed for the fortifications, which contemplated that all of the guns, mortars, and mines of the over-sea defenses and all mines of continental United States should be manned by Regular Coast Artillery troops, and that one-half of the guns and mortars in continental United States should, if practicable, be manned by the Coast Artillery of the militia forces of the seaboard States. This has since been the basis of all presentations of Coast Artillery personnel questions. Eliminating certain batteries declared obsolete by the War Department Board of Review, this policy requires the following numbers of officers and enlisted men of the Regular forces and the State forces to provide a minimum manning body for the defenses which have been constructed or for which appropriations have been made by Congress:

"Defenses constructed and appropriated for."	Officers	Men
Regular Coast Artillery required for all mines, guns, and mortars in canal and insular posts.....	291	6,800
Regular Coast Artillery required for all mines and for one-half of the guns and mortars in the United States.....	940	23,047
Total Regular Coast Artillery required.....	1,231	29,847
Militia Coast Artillery required for one-half of the guns and mortars in the United States.....	711	17,329
Grand total Regulars and Militia required.....	1,942	47,176

The present legally authorized strength of the Regular Coast Artillery Corps is 701 officers (exclusive of chaplains) and 19,019 men. From the table it appears that the present authorized strength is short 530 officers and 10,828 enlisted men of the strength necessary to man our coast fortifications under this approved policy on the basis of the minimum number of officers and men necessary for an efficient service.

In the hearings before the Senate Military Committee, the Secretary of War said, when asked by the chairman of the committee as to which of the bills presented he considered the most important:

"I consider the Coast Artillery the most important, and for this reason, that, isolated as we are on all sides by water, none of our great centers of population, where these great Coast Artillery forts are can be attacked successfully from the sea and laid under tribute if we have efficient Coast Artillery defenses. In other words, if you assume that an

oversea enemy—and all our enemies will be practically oversea—attempts to militarily destroy or invade this country, they first would have either to destroy our fleet, or if they did not destroy our fleet to appear at various points along our coast and bombard our cities."

It is indeed essential that this trained personnel of Regular Coast Artillery be provided if our system of coast defenses is to be efficient on the outbreak of war with any maritime power. It must be had in mind that in any such event the coast line would, immediately on the declaration of war, or even before the declaration of war, become the threatened line. There will not then be time available to train men to serve the coast armament.

In view of the foregoing, the recommendations made by the undersigned in previous reports are urgently renewed, that laws be enacted that shall provide an adequate Coast Artillery personnel for the home fortifications, and that legislation be sufficiently elastic to authorize the President to increase at any time the Coast Artillery forces by the numbers of officers and men necessary to man any new fortifications that may from time to time be authorized by Congress.

Subsequent to the rendition of the above mentioned report, Congress enacted the law known as the National Defense Act, approved June 3, 1916. This legislation provided 1201 commissioned officers and 30,000 enlisted men for the Coast Artillery Corps.

The following are extracts from the Annual Report of the Chief of Coast Artillery dated September 20, 1916, the first of such reports submitted after the passage of the National Defense Act.

The most salient feature bearing on the efficiency of the Coast Artillery Corps, which stands out in relief in the past year, is the fact that, at its last session Congress enacted practically all the recommendations made by the War Department in legislation proposed, with respect to the requirements of the arm as to increases of personnel and increases of materiel. It may be said that with these increases, and the approving policy indicated by Congress with respect to some additional new batteries needed for certain localities, to meet the increased power of attack of the most recent types of guns mounted on battleships, the coast fortifications will be able to meet successfully any attack that can reasonably be expected to be made upon them, or upon the cities, harbors, or interests which they guard, by the most powerful warships afloat or at present projected.

The effect of the recent legislation as to personnel is to provide a complete manning body for the gun and mine defenses of the oversea fortifications and for one-half of the gun defense and all of the mine defense of the home fortifications.

It will be seen from the above that both Congress and the War Department were thoroughly alive in 1916 to the importance of supplying an adequate personnel to man the fortifications provided for the defense of our harbors, since the War Department recommended

to Congress and Congress enacted the necessary legislation to supply all personnel reported by the Chief of Coast Artillery as necessary for this purpose under the War Department policy of that period.

There are certain differences between the personnel requirements and the policy governing its procurement as they existed in 1915-1916, and as they exist today, viz.:

(a) The National Defense Act, as amended to date, makes provision for a third category of troops in the Army of the United States (the Organized Reserves), which can be drawn upon in addition to the Regular and National Guard Coast Artillery troops to furnish a portion of the personnel required.

(b) There have been changes in the requirements for Coast Artillery troops due to:

1. The abandonment of certain batteries and coast defense commands.
2. The installation of new batteries.
3. Additional activities added to the mission of the Coast Artillery Corps resulting from developments during the World War—antiaircraft, railway, and heavy tractor artillery.

The present day requirements in this respect, with consideration given to all these changed conditions, are shown in the War Department Mobilization Plan and will be referred to specifically below:

The Army Appropriations Act approved June 30, 1921, reduced the size of the Army from 280,000 enlisted men (as had been provided in the National Defense Act, as amended in 1920), to 150,000 enlisted men. The Army Appropriations Act approved June 30, 1922, further reduced the size of the Army to 125,000 enlisted men.

Due to these reductions in the size of the Army, the Coast Artillery Corps was reduced by the War Department from 30,000 enlisted men to 12,026 enlisted men. This reduction was made practically upon a pro rata basis, the Coast Artillery Corps being reduced in about the same proportion as was the Army as a whole.

At the time when these reductions were made in the enlisted strength of the Coast Artillery Corps, knowing how seriously the plans of the War Department were disrupted by the reductions made by Congress in the Army, I accepted the reductions made in the Coast Artillery Corps without offering serious objection and have confined myself to setting forth on proper occasions the condi-

tions which have resulted therefrom. I feel it to be my duty now, however, to bring this matter clearly to the attention of the Secretary of War, and to recommend as forcefully as possible that a serious effort be made to correct these conditions; first, by allocating to the Coast Artillery Corps so much of the additional personnel required as is possible from the present authorized strength of the Army; and second, in case the additional personnel which can be so allocated is insufficient to meet the requirements, then, by presenting the facts to Congress with request for such an increase in the authorized strength of the Army as may be necessary for the purpose.

In this connection I ask attention to the following figures comparing the authorized strengths of the Army and of the Coast Artillery Corps at various periods of time.

Date	Authorized Strength Regular Army	Authorized Strength Coast Arty. Corps
June 20, 1907.....	69,525	19,321
June 1, 1916.....	128,426	19,321
May 15, 1917 (Nat. Def. Act 1916).....	239,182	30,126
June 4, 1920.....	280,000	30,000
June 30, 1924.....	125,000	12,026

The military policy of this country is now, as it has always been, based upon considerations concerning the defense of the United States and its territorial possessions against attack, and is, in no-wise, aggressive. The above figures, however, indicate that we have somehow, since June 4, 1920, lost sight of the importance of that branch of the Army which constitutes our first line of defense ashore.

Having in mind the above statement concerning our military policy, it seems evident that the first consideration in providing military forces in this country should be the vital necessity for protecting the continental limits of the United States and our foreign possessions against attack by any first class power or by any reasonable combination of such powers. Consideration of the probable forms of attack which any such power or combination of powers would probably employ against this country can but lead to the conclusion that such attack would be launched primarily by water, or by air, or by both. Anything approaching an adequate defense against such forms of attack demands, at the outbreak of war, a sufficient trained personnel to man completely our harbor defenses, and an adequate antiaircraft defense. Failure in these respects in the first stages of a war of magnitude would, without doubt, add immeasurably to the difficulty of a successful defense and might prove disastrous.

Millions of dollars have been expended to install the armament and accessories in our harbor defenses, all of which may have been

wasted if an adequate personnel is not provided for its maintenance in proper condition for immediate use at the outbreak of war and for its proper operation when, and if, that time comes.

A recent study made by the War Department indicates that 19 coast defense commands in the Continental United States should be retained. Nine are now provided with only caretaking detachments varying from 7 to 35 enlisted men—a force adequate to prevent serious deterioration of the armament, but wholly inadequate to maintain the armament and accessories in condition for immediate use. The 10 remaining coast defense commands are provided with enlisted personnel varying from 124 to 500 men—sufficient to maintain properly the armament and accessories in condition for immediate use, but wholly inadequate to man the defenses at the outbreak of war, even when reinforced by the National Guard Coast Artillery units provided by the War Department Mobilization Plan.

The War Department Mobilization Plan provides, in each of these 19 coast defense commands, for the personnel required to man the armament and accessories. This personnel is made up of a certain number of Regular, National Guard and Organized Reserve batteries.

The War Department Mobilization Plan, 1923, contained an assumption that M-day would precede D-day by three months. On this assumption, the allocation of Coast Artillery troops to the three categories of the Army and Regular Coast Artillery units kept in an active status were probably such as to provide adequate personnel to man our harbor defenses on D-day.

The War Department Mobilization Plan, 1924, assumes that M-day and D-day may be coincident, which I believe to be a correct assumption.

No change is made in the 1924 Plan, however, as the result of this change in assumption regarding M-day, in the allocation of Coast Artillery troops to the three categories or in the Regular Coast Artillery units kept on an active status.

Of the personnel provided by the War Department Mobilization Plan none will be immediately available at the outbreak of war except those Regular batteries which are kept on an active status and the National Guard batteries. Even these will be at peace strength and must be expanded. The Regular batteries must furnish cadres for inactive batteries and all must then be expanded to war strength. The National Guard batteries must be expanded from peace to war strength. The Organized Reserve batteries must be expanded from small cadres to war strength batteries. The greater this expansion of units, the longer the time which will be required to provide properly trained units to man the armament and accessories.

It is the generally accepted view that National Guard Coast Artillery batteries can be expanded from peace to war strength without materially interfering with their ability to man the elements of the defense to which they are assigned. This, however, is probably the limit of expansion for such units that can be assumed with safety. On the other hand, the greater expansion that will be required of the Regular batteries and the expansion and complete training of the Organized Reserve batteries will render it impossible for these units to man, within any reasonable time, the elements of the defense to which they are assigned unless the proportion of active Regular batteries be increased very materially over that which now obtains. A conservative limit to which such expansion can be carried and still permit the armament and accessories to be adequately manned within a reasonable time is from 1 to 2; that is, that one battery can furnish a cadre to one other battery, and both can then be expanded to war strength and trained to man the elements of the defense to which they are assigned within a reasonably short period of time. During this process of expansion the more important elements of the defense can be manned in case of necessity by the active Regular and National Guard units.

In table A below, there is shown the number of Regular, National Guard, and Organized Reserve Coast Artillery firing batteries provided in the War Department Mobilization Plan for each Coast Defense Command. As stated above, the National Guard units are assumed to expand to war strength without assistance. The sum of the Regular and Organized Reserve firing batteries in the coast defense commands to which each Coast Artillery regiment is assigned divided by two gives the minimum number of Regular firing batteries which should be kept active in that regiment, and at a peace strength of 125 enlisted men (approximately three-fourths of the war strength requirement).

An allotment of Regular Coast Artillery Corps strength, as shown in this table, will automatically provide each coast defense command with a sufficient personnel to care properly for the armament and accessories in time of peace; it will provide sufficient personnel in convenient localities for the proper training of the National Guard and Organized Reserve Coast Artillery batteries assigned to harbor defense duties; and it will provide sufficient personnel in each of our harbor defenses to insure, immediately upon the outbreak of war, the mine defense of the harbor. With the present allotted strength assigned to harbor defense duty, none of these conditions obtain, with the possible exception of the second, and this, not to a satisfactory degree.

TABLE A—HARBOR DEFENSES.

Coast Defense Commands	Regiment (Regular C.A.C.)	Firing batteries provided by the W.D. Mob. Plan.			No. of Reg. C.A.C. firing batteries which should be kept on an active status.	Enlisted Strength	Remarks
		Reg.	N.G.	O.R.			
Portland	8th C.A.	6	12	4	6	750	
Portsmouth		1	0	4	1	125	
Boston	9th C.A.	7	12	8	7	875	
New Bedford		1	0	2	1	125	
Narr. Bay		6	9	0	4	500	
Long Is. Sound	11th C.A.	10	7	3	7	875	
So. New York	5th C.A.	7	0	12	7	875	Interior Line—greater expansion possible.
Sandy Hook		4	14	3	4	500	
Delaware		3	2	5	3	375	
Chesapeake Bay	12th C.A.	7	8	6	7	875	
Charleston		2	8	0	1	125	
Key West	13th C.A.	2	5	0	1	125	
Pensacola		3	4	1	2	250	
Galveston		3	2	3	3	375	
San Diego		2	5	1	2	250	
Los Angeles	3rd C.A.	2	0	5	3	375	1 bty 3rd C.A. to be transf'd Col. to L. A.
The Columbia		3	5	1	2	250	
San Francisco	6th C.A.	10	0	15	10	1250	5 NG btys to be organized. 5 O. R. btys. demobilized.
Puget Sound	14th C.A.	10	10	3	7	875	
TOTALS		89	103	76	78	9750	

NOTE.—Five National Guard batteries and one Organized Reserve battery now allotted to the District of Columbia are not included in this table. They are at present assigned to the Coast Defenses of Baltimore and the Potomac. These coast defense commands are to be abandoned when the armament to be installed at the entrance to Chesapeake Bay has reached a satisfactory state of completion. The batteries mentioned, however, will then be required to man the added armament at the latter point—harbor defense and antiaircraft.

The War Department Mobilization Plan provides 19 regiments of antiaircraft artillery in the first phase of mobilization. Seven of these 19 regiments are allocated to the National Guard. The majority of the units composing these seven regiments have been organized and federally recognized. There can be no disputing the statement that these 19 regiments of antiaircraft artillery will be found totally inadequate to meet the needs for this class of artillery during the first phase of a mobilization, when, in addition to the protection required by military and naval establishments, it will be vitally necessary to provide antiaircraft protection for extensive industrial areas which contain activities engaged in the production of war materials.

It is manifest that provision should be made to insure all of these 19 regiments being in condition for active service within the first month of mobilization. Studies of the requirements in this respect have not yet progressed to a point where a definite estimate can be made thereof. Without doubt, as these studies proceed, the necessity for a much larger force, to be available during the first phase of mobilization, will be indicated. No Organized Reserve antiaircraft regiment could possibly be prepared for such service by that time. It follows that 12 of these regiments should now be provided in the Regular Army category.

Assuming, as in the case of harbor defenses, that the most that can be expected of the National Guard regiments, will be their expansion from peace to war strength, Regular antiaircraft regiments should be provided as shown in table B below. These regiments are given the full peace strength of an antiaircraft regiment. Each regiment would be expected to expand within the first month of mobilization to two full regiments—a total of 12 regiments.

The possibilities of expansion in the case of these units are certainly no greater than in the case of harbor defense units. The probable necessity for their use in the early stages of a war of magnitude is the same and the difficulties to be encountered in preparing them for such service would be similar.

The allotment of these regiments to Corps Areas is shown in the table. Such an allotment would very greatly facilitate the training of National Guard and Organized Reserve antiaircraft regiments.

The antiaircraft service is of vital importance, and I feel that the allotment of personnel shown in this table is an under estimate of the requirements to insure even a reasonable antiaircraft defense.

TABLE B.
ANTIAIRCRAFT ARTILLERY

<i>Corps Area</i>	<i>Units</i>	<i>Enlisted Strength</i>
2nd	1 Regiment	1050
3rd	1 Regiment	1050
4th	1 Regiment	1050
5th	1 Regiment	1050
6th or 7th	1 Regiment	1050
9th	1 Regiment	1050
		<hr/>
		6300

The War Department Mobilization Plan provides five regiments and one battalion of railway artillery in the first phase of mobilization—one Regular regiment, four Organized Reserve regiments and one Organized Reserve battalion. There are no National Guard units allotted to this service and it is unlikely that any railway artillery units could be successfully organized in that category of the Army. All these units are required by defense plans for use in coast defense. They should be ready for service, therefore, cer-

tainly within the first month of mobilization. No Organized Reserve railway artillery regiments could possibly be prepared for service by that time. All these units should be provided, therefore, in the Regular Army category. Under the same assumptions regarding expansion as were made in the case of antiaircraft artillery regiments, there is shown in table C below the minimum strength of Regular Coast Artillery enlisted personnel which should be allotted to this service. Two regiments at full peace strength and one at one-half peace strength are shown allotted to the 3rd Corps Area (to be stationed at Fort Eustis, Va.) and one regiment at one-half peace strength allotted to the 9th Corps Area. Upon mobilization the two full peace strength regiments would be expanded into four full regiments and one of the one-half peace strength regiments would be expanded into a full regiment. This would provide five regiments and one battalion, railway artillery, required. The second one-half peace strength regiment would not be expanded unless subsequent study of defense plans or subsequent developments in operations after the outbreak of war indicated the necessity for more units of railway artillery during the first phase of mobilization than are at present estimated as required. One railway artillery brigade headquarters is provided, since the units proposed and allotted to the 3rd Corps Area would require such a headquarters for their proper administration and training. This brigade headquarters would also provide a post headquarters for Fort Eustis, Virginia.

TABLE C
RAILWAY ARTILLERY

<i>Corps Area</i>	<i>Units</i>	<i>Enlisted Strength</i>
3rd	1 Brig. Hq. and Hq. Btry.	44
	1 Regiment	829
	1 Regiment	829
	1 Regiment	415
9th	1 Regiment	415
		<hr/>
		2532

The War Department Mobilization Plan provides for six regiments of heavy tractor artillery in the Coast Artillery Corps during the first phase of mobilization—one Regular, two National Guard, and three Organized Reserve regiments. These regiments, like the railway regiments provided, are required for use in coast defense and therefore will be needed at the earliest possible moment after D-day. No Organized Reserve heavy tractor regiment could possibly be prepared for active service within the first month of mobilization. As in the case of other National Guard Coast Artillery organizations, it is assumed that the two National Guard heavy tractor regiments could be expanded from peace to war strength without inter-

ferring with their immediate use. There should be provided in the Coast Artillery Corps of the Regular Army, four regiments of heavy tractor artillery. Table D below shows the minimum strengths which should be allotted to this service. One regiment at peace strength and one at one-half peace strength are shown allotted to the 3rd Corps Area (to be stationed at Fort Eustis, Virginia), and one regiment at one-half peace strength allotted to the 9th Corps Area. These regiments, when expanded, would provide the four regiments required.

TABLE D
HEAVY TRACTOR ARTILLERY

<i>Corps Area</i>	<i>Units</i>	<i>Enlisted Strength</i>
3rd	1 Regiment	1076
	1 Regiment	538
9th	1 Regiment	538
		2152

No change in the present allotment for the Sound Ranging Service is recommended. The allotment of 70 enlisted men, organized into Sound Ranging Battery No. 1, is, in my opinion, sufficient to carry on the necessary development work in this service and to provide for the necessary expansion upon mobilization.

As to the Coast Artillery Corps contingent in our foreign garrisons, the situation in the Panama Canal Department is similar to the situation in the United States. The possibilities of expansion are the same. The necessity for having the full war garrison available at the earliest possible moment after D-day is, if anything, more vital. Defense plans provide for 8104 enlisted men of the Coast Artillery Corps for the war garrison. Using the same ratio of peace to war strength of units and assuming the same possibilities of expansion as in the case of the harbor defenses in the Continental United States, the peace garrison of Regular Coast Artillery Corps which should be maintained in the Panama Canal Department is 2980 enlisted men. It is now 1800.

In the Hawaiian Department the situation is not the same. To assume that reinforcements can be sent to that department after the outbreak of war is a dangerous policy. The war requirements for this garrison, less those reinforcements which are obtainable locally from the draft, should determine the size of the peace garrison. So far as concerns the Coast Artillery Corps, these figures are as follows, taken from the defense plan: War requirements (7453), less reinforcements obtainable locally (3461), equals 3992 enlisted men—the proper peace garrison. It is now 3000.

Under the present War Department policy of utilizing Filipino troops for Coast Artillery duty in the Coast Defenses of Manila and Subic Bays, the necessary reinforcements to bring the Coast Artillery Corps peace garrison in the Philippine Department up to the strength required by the defense plan is obtainable locally. I question the advisability of a continuance of this policy, involving as it does the placing of dependence upon Filipino troops for the main defense of what might be called the "keep" of the Philippine Islands. The Coast Artillery Corps peace garrison in the Philippine Department now consists of 1200 American and 2400 (authorized) Philippine Scout Coast Artillery. The Defense Plan calls for 3600 enlisted men. I recommend that the American Coast Artillery garrison be increased to provide the full 3600 men required by the Defense Plan, and that no Philippine Scout troops be used for this purpose.

Below is a recapitulation showing the strengths now allotted to the various activities of the Coast Artillery Corps and the strengths which should be allotted to each, if we expect to insure a reasonable efficiency in time of need of this first line of defense.

RECAPITULATION

	Now Allotted	Recommended
Office, Chief of Coast Artillery.....	8	8
Harbor Defenses in U. S.....	3,405	9,750
Coast Artillery School.....	199	199
Anti-aircraft Artillery in U. S.....	1,323	6,300
Railway Artillery in U. S.....	595	2,532
Heavy Tractor Artillery in U. S.....	426	2,152
Sound Ranging Service.....	70	70
Foreign Garrisons.....	6,000	10,572
Total additional required.....	12,026 19,557	
	31,583	31,583

Once more, I recommend serious consideration of steps to remedy this situation.

COMMISSIONED OFFICERS

The following table shows the commissioned personnel, by grades and numbers which will be required for duty with Coast Artillery troops in case the increases in enlisted strength, shown above to be necessary, are made. It will be noted that a total increase of 677 commissioned officers will be required for this purpose.

TABLE E

Commands	Major Gens.	Cols.	Lt. Cols. and Majors	Captains.	Lieuts.	Totals	Pre- sent Totals	Pro- posed increase
Harbor Defenses in U. S..		14	48	126	176	364	189	175
Antiaircraft Artillery in U. S.		6	18	90	144	258	53	205
Railway Artillery in U. S.		2	13	35	82	132	24	108
Heavy Tractor Artillery in U. S.		1	8	28	61	98	17	81
Sound Ranging Battery No. 1.				1	2	3	3	0
Foreign Service, Panama.		4	14	42	54	114	70	44
Foreign Service, Hawaii.		4	14	47	82	147	107	40
Foreign Service, Philip- pines.		3	14	40	70	127	103	24
Coast Artillery District Staffs.		5	5			10	10	0
Office, Chief of Coast Artillery.	1	4	5			10	10	0
U. S. Misc. as at present.		3	58	44	11	116	116	0
TOTAL.		1	46	197	453	682	1379	
<i>Present Authorized Dis- tribution.</i>		1	30	124	245	302		702
<i>Proposed Increase.</i>		0	16	73	208	380		677

I have referred on several occasions to the hardships which frequently result from a rigid application of the present policy of assigning officers to duty on foreign service. I am convinced that the feeling which officers have—that at a particular time they will be detailed to foreign service, regardless of any urgent personal reasons they may have at the time for desiring to remain within the United States—is very harmful to the morale of the officer personnel. In time of hostilities, officers expect that their personal convenience will receive little or no consideration. In time of peace, however, a policy which apparently bears with unnecessary harshness cannot but operate to produce discontent within the service at a time when the best efforts of the War Department are required to retain a satisfied corps of efficient officers. I recommend, therefore, that this policy be amended so as to permit exceptions to a limited extent when, in the opinion of the Chief of Branch concerned, such exceptions are necessary.

NONCOMMISSIONED STAFF OFFICERS, COAST ARTILLERY CORPS

The following table shows the status of noncommissioned staff officers, Coast Artillery Corps, on June 30, 1924, and the authorization under recent legislation.

TABLE F.

	Elect.	Radio	Clerical	Artillery	Supply	Band	Total	Allotted under Act of June 6, 1924
Master Sergeants....	47	0	24	10	1	0	82	97
Technical Sergeants....	78	2	0	2	0	0	82	*219
Staff Sergeants....	95	35	58	22	4	13	227	355

* Includes 120 1st Sergeants.

During the past year Coast Artillery noncommissioned staff officers, Clerical, Electrical, Master Gunner and Radio, have been

placed on a single promotion list arranged in order of length of service in the noncommissioned staff. They are now promoted in accordance with their standing on that list. Appointments to the grade of staff sergeant in these categories are made in accordance with the requirements of the service from eligible lists maintained separately for each of the various classes. Supply, Color and Band Sergeants in these three grades are appointed and promoted by Regimental Commanders.

COAST ARTILLERY OFFICERS' RESERVE CORPS

Table G shows the changes in the Coast Artillery Officers' Reserve Corps during the past year. It will be seen that the total strength is less by one than it was a year ago. In this connection, however, it should be noted that the number of reserve officers who have been separated from the service during the past year by reason of expiration of commission is considerably greater than is to be normally expected.

TABLE G.

Grade	Cols.	Lt. Cols.	Majors	Captts.	1st Lts.	2nd Lts.	Totals
Commissioned, July 30, 1923.....	19	30	148	409	501	2185	3292
Gains, R.O.T.C. Units.....						260	260
Transfer.....	3		4	14	11	26	58
Promotion.....	5	23	66	98	131		318
Other sources.....		3	16	139	157	223	543
	27	56	234	660	800	2694	4471
Losses, Promoted.....				23	66	98	131
Resigned.....				1	3	4	4
Discharged.....				5	12	9	45
Transferred.....				6	9	8	22
Death.....				1			4
Declined re-commission.....				2	10	24	179
Expiration of commission.....				5	19	69	421
TOTAL.....				43	119	212	806
Total commissioned June 30, 1924.....	27	56	191	541	588	1888	3291

The distribution of Reserve Officers to the various groups is as follows:

TABLE H.

Corps Area or Department	1	2	3	4	5	6	7	8	9	Panama	Hawaii	Philippines	China	Total
G. A. Group.....		1		1										2
B. A. Group.....	18	18	25	9	2	3	1	5	20					101
In R. A. Enl.....	14	22	24	23	11	19	1		2					116
Civilians.....														
T. A. Group.....														
Assig. to Reserve Units.....	346	413	231	308	119	188	182	105	252					2144
In Nat'l Guard	109	52	58	12		9	18		33					291
*Unassigned.....	86	59	91	101	14	79	72	21	86	11	12	4	1	637
	573	565	429	454	146	298	274	131	393	11	12	4	1	3291

* 260 of these recently commissioned from R.O.T.C.

TRAINING

The training of Coast Artillery troops in the continental limits of the United States has been handicapped by the limited personnel available, and in some cases, by lack of necessary materiel, especially harbor boats and certain antiaircraft materiel.

Every effort has been made to maintain expert nuclei of regular Coast Artillery troops for training citizen soldiers in all duties pertaining to the activities with which the Coast Artillery Corps is charged. These nuclei have been used for the intensive instruction of the R. O. T. C., C. M. T. C., Organized Reserves, and National Guard. As a general rule, this training has been cared for in a satisfactory manner wherever such regular Coast Artillery troops were available. In some corps areas, however, there have been no units of regular Coast Artillery troops available for instruction purposes. As a result, the instruction in these localities has not been up to the desired standard. This is especially true of antiaircraft instruction. This instruction cannot be carried out in a satisfactory manner with the limited number of regular Coast Artillery troops now available for assignment to the antiaircraft service.

Training of the Coast Artillery troops assigned to fixed batteries in the harbor defenses has progressed satisfactorily and has been of such a nature as to warrant the belief that these troops can fulfill their mission in time of war, so far as the very limited available personnel will permit. A satisfactory improvement in the results obtained by railway and tractor artillery in firing at moving targets has been attained. This improvement was facilitated by the supply of certain fire control materiel to the batteries assigned to railway and tractor artillery.

Training of the regular Coast Artillery troops assigned to antiaircraft artillery is progressing rapidly. Firings at targets towed by airplanes have been successfully conducted by a large proportion of our regular antiaircraft units. The interest shown by all concerned insures a rapid and continuous development of antiaircraft artillery training. This cannot come up to the required standard, however, until much new materiel, some of which is far from being completely developed, is made available for use by antiaircraft troops.

Reports of target practices and the comments of Coast Artillery district commanders thereon indicate a high state of training among Coast Artillery troops in the Panama Canal and the Hawaiian Departments. Similar reports from the Philippine Department indicate that Coast Artillery training in that Department is proceeding very satisfactorily.

At the Coast Artillery School, Fort Monroe, Virginia, instruction was given during the year to officers and enlisted men as follows:

OFFICERS' DIVISION

Advanced Course from January 7, 1924 to June 14, 1924—39 Field Officers and two Captains of the Coast Artillery Corps. This course has now been extended and hereafter will be conducted throughout the full school year.

Battery Officers' Course from September 17, 1923 to June 14, 1924—43 officers of the Coast Artillery Corps and two officers of the Cuban Army. I desire to invite attention to the real necessity now existing for an increase in the number of officers detailed each year to pursue this course.

If this is not done, it will result within a few years in there being a large number of Coast Artillery officers of from nine to 12 years' service who will not have received the training imparted in this course. The disadvantage of delaying this important step in an officer's career for so long a time is obvious. The increase in the number of officers detailed should be continued for a period of about five or six years. By that time this very undesirable condition will have been corrected and a reduction to the normal number can be made. Attention is invited to my recommendation on this subject, submitted on June 27, 1924, in which the matter is discussed at length.

Advanced Engineering Course from September 17, 1923 to December 15, 1923—10 officers of the Coast Artillery Corps.

Special Course for National Guard and Reserve Officers assigned to harbor defense organizations from September 17, 1923 to December 15, 1923—Seven officers of the National Guard and one Reserve Officer.

Special Course for National Guard and Reserve Officers assigned to antiaircraft organizations from September 17, 1923 to December 15, 1923—Four officers of the Organized Reserves and five officers of the National Guard.

ENLISTED MEN'S DIVISION

Regular Courses—Artillery Course, Engineering Course, and Radio Course from September 17, 1923 to June 14, 1924.

The following number of students completed these courses:

Artillery Course	2
Engineering Course	4
Radio Course	12

Special Courses—Artillery Course (National Guard) from September 17, 1923, to December 20, 1923—Four students completed this course.

Radio Course (National Guard) from September 17, 1923, to December 20, 1923—One student completed the course.

All classes in the Enlisted Men's Division were smaller than usual this year, because of the limited amount of transportation funds available.

On May 24, 1924, the Coast Artillery School celebrated the one hundredth anniversary of its establishment. Appropriate exercises were held in honor of the occasion.

Seven hundred and eighteen students, of whom four hundred and thirty-five were Coast Artillery Reserve Officers, have pursued the Coast Artillery Correspondence Courses during the year. The courses were revised in 1923 to conform to the texts available, many changes being necessary on account of the shortage of documents. The courses for the school year 1924-25 will use such training regulations as have been published and the subcourses have again been revised to conform to the new texts. Further revision will be necessary when all training regulations have become available.

During the year 1923-24, twenty-two Coast Artillery training regulations have been published. In addition to these, sixteen have been approved by the War Department for publication. It is expected that the entire Coast Artillery series of training regulations will be practically completed during the fiscal year 1925, though continuous revision of these training regulations will be necessary.

Training of the Coast Artillery Organized Reserves has not, as a rule, reached the standard reasonably to be expected. Large numbers of Reserve Officers are failing to take the Correspondence Courses available to them. It is believed that improvement could be brought about in this respect by a small increase in the number of regular officers detailed to duty with Coast Artillery Organized Reserve units and an increase in mileage sufficient to permit those on such duty to consult more freely with the officers of these units.

Coast Artillery Organized Reserve Camps were held at Fort Adams, R. I.; Camp Upton, N. Y.; Fort Hancock, N. J.; Fort Monroe, Virginia; Fort Barrancas, Florida; Fort Sill, Oklahoma; Fort Bliss, Texas; Fort Sam Houston, Texas; and Fort Winfield Scott, California. It is estimated that 600 members of the Officers' and Enlisted Reserve Corps attended these camps, the number being limited by the funds available for pay and mileage.

During the academic year 1923-24, Coast Artillery units of the Reserve Officers' Training Corps have been conducted in eighteen

institutions. The total enrollment was 4249. There were on duty with these units 44 commissioned officers and 54 enlisted men. The courses, as conducted, were in general satisfactory. A standardized program of instruction for the Coast Artillery Reserve Officers' Training Corps units has been approved by the War Department and will be in effect during the academic year 1924-25. Considerable elasticity must be permitted in the instruction in the different units on account of the great variations in the institutions in which the units are established. In some cases, as at the University of Michigan, the instruction is voluntary, while in others, as at the Citadel, Charleston, S. C., the institution is operated on a strictly military basis. It is believed, however, that the graduates of all the institutions who take the course prescribed for students of the Reserve Officers' Training Corps will be well qualified for appointment as second lieutenants of the Organized Reserves.

There are no Coast Artillery Reserve Officers' Training Corps units in the Second Corps Area. This matter has been under consideration for a considerable period of time but as yet no definite action has resulted. It is a matter of very great importance that at least two units be established in that corps area in the near future to provide Reserve Officers for the numerous Coast Artillery Units allotted thereto.

There were 288 Coast Artillery Reserve Officers commissioned from Reserve Officers' Training Corps units in the calendar year 1923. This is about 100 short of the number required to replace the estimated annual loss.

Coast Artillery Reserve Officers' Training Corps camps were held at Fort Monroe, Virginia; Fort H. G. Wright, N. Y.; Fort Casey, Washington; and Fort Barrancas, Florida. It is estimated that 450 students attended these various camps. The restriction on numbers attending, due to the limited amount of funds available for transportation, practically eliminated the attendance at these camps of basic students from the Fifth, Sixth and Seventh Corps Areas.

Coast Artillery Citizens' Military Training Camps were held at Fort Monroe, Virginia; Fort Barrancas, Florida; Fort Adams, R. I.; Fort Hancock, N. J.; Fort Winfield Scott, California; and Fort Casey, Washington. It is estimated that 1500 students of the Red, White and Blue courses attended these various camps. The War Department programs of instruction were followed and satisfactory results were attained.

Since the several Coast Artillery District Commanders have assumed, in general, active control over the training and instruction of all Coast Artillery regiments of the Regular Army and Organized

Reserves, as directed in paragraph 2, Army Regulations 90-30, which defines the duties of Coast Artillery District Commanders, there has been an improvement in the efficiency of these units. This improvement is particularly noticeable in the summer training of Coast Artillery National Guard regiments. The tactical and training inspections made by Coast Artillery District Commanders have proved beneficial.

Reorganization of the Coast Artillery Corps into regiments, directed by the War Department in General Orders No. 8, February 27, 1924, was effected at midnight, June 30—July 1, 1924. I am convinced that this reorganization will have a far-reaching effect upon the efficiency of the Coast Artillery Corps, including the National Guard and Reserve Units.

MATERIEL

No change has been made during the past year in the project for mounting 16-inch guns on barbette carriages in our harbor defenses. Of the twenty-eight 16-inch guns for which locations have been approved, four have been mounted and two are being mounted. Construction of the emplacements for four additional guns will be started during the coming fiscal year and preliminary plans for the emplacement of fourteen guns are being prepared by the Corps of Engineers. No action has been taken as yet regarding emplacement of the remaining four guns of the project. The necessary 16-inch guns to complete the project are on hand. Six carriages are now in storage awaiting shipment and two more will be completed and ready for shipment by the end of September, 1924. The installation of these completed guns and carriages is being delayed by a lack of sufficient funds to enable the Corps of Engineers to construct the necessary emplacements. Due to the fact that modern naval guns outrange the older guns in our harbor defenses, every proper effort should be made to provide the money necessary for the completion of this project at an early date.

Due to the limited funds available, progress in the installation of fire control systems for the long range guns now installed has not been satisfactory. Wherever possible temporary systems have been provided so as to provide for firing these batteries in case of emergency. These temporary systems are necessarily inefficient. To secure the maximum service from the long range guns, complete and permanent fire control systems should be supplied as rapidly as possible. A definite advance was made in this direction during the past year by reason of the approval by the War Department of a project for the completion within a certain number of years of the

fire control systems for the long range guns now installed. This approval provides a definite basis for the initiation of plans for the completion of the separate fire control projects for the United States, Panama and Oahu within the time limits required by the situation and funds should be provided to carry these plans into effect. The War Department has also approved the policy of providing the necessary fire control systems for new batteries at the time of their construction. In order that these batteries may be effective immediately upon completion of the construction of the emplacements and the mounting of the guns, this policy should be continued.

Development work on Ordnance fire control equipment for our modern armament has been continued throughout the year to the limit of funds available. One of the two special plotting devices under test, while not entirely satisfactory in its present form, has shown many excellent features and the instruments are being returned to Frankford Arsenal for alteration and further development. Development work on the other device has been discontinued for the present as a result of extended tests. The universal deflection board under construction is now nearing completion and will be submitted to the Coast Artillery Board for test during the coming year. The transformation of 26 Whistler-Hearn Plotting Boards into Cloke Plotting and Relocating Boards was undertaken during the year. A large number of these boards have been transformed and issued to the service while the work on the remainder is practically complete and they will be issued in the near future. The Cloke Plotting and Relocating Board provides for the interchangeability of base lines and, therefore, adds greatly to the flexibility of our fire control systems. The modification of the Pratt Range Board, to meet the new conditions caused by the long range modern artillery, has been undertaken and will be pushed to completion.

Progress in the development of subaqueous sound ranging during the year has been limited by the funds available. This development work has passed the stage of simple and inexpensive experiments and is therefore proceeding more slowly than in former years. During the past year a multispot binaural system has been completed and is now ready for test. Reports indicate that this system offers great promise. The shore station equipment has also been consolidated and redesigned so as to require less space, thus making a decided improvement. This development work should be continued since this system will be a valuable auxiliary to any visual position finding system.

The ammunition policy for major caliber guns which has been in force for several years is unsatisfactory under present conditions

and a restudy of this problem was instituted during the year. As a result of this study, a new ammunition policy was submitted to and approved by the War Department. I believe this new policy fully meets the requirements of the situation without involving an excessive expenditure of funds.

The use of 14-inch railroad artillery to reinforce the coast defenses received full consideration during the study resulting in the approval of the locations for 16-inch guns referred to above. The necessary 14-inch guns are on hand but to date only one 14-inch railway carriage, suitable for firing at moving targets, has been completed. This carriage has been tested by the Ordnance Department and accepted as satisfactory. It is now undergoing minor alterations at Aberdeen Proving Ground and will shortly be turned over to the Coast Artillery for service test. In order that the limitations governing the transportation and use of this gun and carriage may be definitely determined, it is contemplated to send it to the 9th Corps Area for test. The necessary funds should be provided for this purpose. The Ordnance Department is proceeding with the manufacture of three more of these carriages, one of which will be completed during the next fiscal year. Since 14-inch guns on railway mounts are being relied upon to strengthen and complete our defense of the coast, further provision should be made for the manufacture of railroad mounts for these guns.

Satisfactory training of motorized regiments of Coast Artillery has not been possible during the past year due to the extreme shortage of funds allotted for the purchase of gasoline and lubricants. The sum of \$137,218.00 to be allotted for this purpose during the coming fiscal year will allow for approximately 150 hours operation, as determined by a detailed study of the requirements of each of the various regiments. One hundred and fifty hours training per year is considered the minimum necessary to maintain these units in efficient condition.

No progress has been made in the development of the non-draggable mine since my last report, due to inability to reach a satisfactory settlement with the inventor. This mine is designed to be held on the bottom, attached to its anchor, until a few seconds before it is to be fired. Its development may offer a solution of the difficult problem now connected with the submarine mine defense of certain harbors where deep water and swift currents must be contended with.

Slight modifications have been made in the controlled submergence mine which has been undergoing service test in the Coast Defenses of Balboa. A further service test has been recommended which should result in the determination of an approved type for

this mine. Electrical control from shore permits the elevation or depression of this mine corresponding to tide variations, to maintain any desired depth of submergence, thus overcoming one of the serious difficulties encountered in a few of our important harbors.

Development of the four new types of antiaircraft guns and carriages, described in my last annual report, has been continued throughout the year. Due to the very serious shortage of modern antiaircraft armament now existing, every effort is being made to expedite this work.

The .50-caliber antiaircraft machine gun has passed the preliminary tests. Fifteen of these guns with tripod mounts have been completed. During the coming year these guns will be given a service test. It is expected that twenty-five additional guns and tripods will be manufactured. This gun is to be substituted for the .30-caliber antiaircraft machine gun now in service. The .50-caliber gun has a horizontal range of about 27,000 feet, a straight up range of 9000 to 12,000 feet and a rate of fire of about 450 shots a minute. This rate of fire was reported in my last annual report as 800 shots a minute through error. These characteristics make it a very effective weapon especially as it is contemplated to provide it with tracer ammunition visible by night up to 7500 feet and by day up to 6000 feet.

One 37-mm. automatic machine gun, with a muzzle velocity of 1800 foot seconds, has been built by the Ordnance Department during the past year. As a result of the test of this gun a redesign has been accomplished with a view to securing a gun capable of producing a muzzle velocity of 3000 foot seconds. This high power gun will be completed at an early date and subjected to a thorough test. A similar gun has also been developed by Mr. Browning and will be tested in the near future.

One 3-inch antiaircraft gun on fixed mount, Model 1917 MI, has been completed and tested during the year. This gun and mount, with slight modification, has been approved for production. The manufacture of nine guns and fifteen carriages of this model for Panama will be undertaken during the fiscal year 1925, but sufficient funds will not be available for the completion of all of the carriages.

Ordnance tests of the 3-inch antiaircraft gun on mobile mount have been practically completed and as soon as some minor alterations have been made it will be sent to Fort Monroe, Va., for service test. A rate of fire of fifteen shots a minute can be secured with this gun with a projectile weighing fifteen pounds. The carriage allows full 360 degree traverse to enable the gunner to follow his target in any direction and the gun can be elevated to 80 degrees, making it

effective at altitudes up to 21,000 feet. As soon as the service tests indicate this to be a satisfactory model, a project will be initiated for its manufacture and issue to the antiaircraft service.

Development of the 4.7-inch antiaircraft gun has not progressed satisfactorily during the past year, due to difficulties of design that have been encountered.

The antiaircraft fire control equipment now in use is unsatisfactory, and the development of better equipment has been delayed because of the limited funds appropriated. Studies have been made of foreign instruments but sufficient funds have not been available for their purchase. This development work is of very great importance and provision should be made for its prompt and successful completion, by securing adequate appropriations therefor.

Our antiaircraft artillery is without any efficient apparatus for the location of aircraft at night by sound. The responsibility for the development of such apparatus was transferred from the Signal Corps to the Ordnance Department during the year. Work has been started by collecting and abstracting all available data and placing the apparatus now on hand in serviceable condition for test. A special plotting board for use in this work has been purchased from the Bureau of Ordnance of the United States Navy. A French instrument considered to be one of the best existing types, has been procured and is now on hand. These appliances will be sent to the Coast Artillery Board in the near future for test. The lack of a satisfactory apparatus for this purpose places our antiaircraft artillery at a very serious disadvantage in night firing. Every effort is being made to remedy this defect.

Accurate night firing with any class of artillery is dependent upon illumination of the target. The number of searchlights now available for this purpose is insufficient for present needs and is totally inadequate to meet the requirements of mobilization. Production cannot be secured in less than seven months and, after that, under the approved Engineer survey of manufacturing facilities, will never exceed current requirements. Facilities for production cannot be relied upon therefore to make up the existing deficit.

The necessity for searchlights and sound locating apparatus for antiaircraft artillery is clearly shown by the following quotations from the McNair Board, which board was convened in the Hawaiian Department.

"It is emphasized that effective fire against bombers is dependent upon illumination of the target. This was forcibly impressed upon the board at the first night tracking drill. The plane carried too small lights and could not be seen. The time consumed in pick-

ing up the plane even with numerous searchlights was altogether prohibitive, in spite of the fact that the plane was flying at a known altitude and over a prearranged course. There are no listening devices in this department.

"It follows that listening devices are essential, and they must be of sufficient accuracy to place the beam of the searchlight on the target or very close to it. Moreover a generous supply of lights is essential, in order to cover errors of listening devices, failures of lights and multiplicity of targets. The power of a battery against targets which are not illuminated is but a small fraction of its power against targets which can be seen clearly." (Par. 57).

* * * *

"The answer to the question by the War Department quoted in paragraph 33, *b* is that the bomber is outmatched by the antiaircraft artillery at all altitudes which can now be reached by service bombers, provided that the target can be seen." (Par. 58).

The antiaircraft situation is well summed up in the conclusions of the McNair Board in the following words:

"The antiaircraft artillery on land is a thoroughly effective means of defense against the bomber, provided it is available in adequate quantity and that searchlights and listening apparatus are capable of detecting and illuminating the target." (Par. 63 *a*).

Antiaircraft artillery is a comparatively recent development and improvements have been rapid. Extensive development work is in progress as I have indicated above, but in case of war large quantities of antiaircraft artillery would be needed at once and no effective equipment is now on hand to supply this need. I recommend that liberal appropriations of funds be secured for intensive development of antiaircraft materiel and fire control apparatus.

Until defense plans have reached a point where a reasonable estimate can be made of the antiaircraft troops required during the different phases of mobilization, no definite estimate can be made of the antiaircraft material which will be required. However, it is anticipated that such an estimate will be possible during the coming year. As soon as the development of material has reached a proper state of completion and the requirements concerning personnel can be reasonably estimated, I will submit definite recommendations to provide a progressive program of manufacture to meet the requirements.

WAR AND MOBILIZATION PLANS

The War Department Mobilization Plan, 1923, has been completed to include practically all unit plans. This plan, although

somewhat deficient and incomplete concerning its provisions for Coast Artillery units, has resulted in an intensive study of the Coast Artillery requirements and of the methods to be used in mobilizing Coast Artillery units. The results of this study have been incorporated in the 1924 plan.

The War Department Mobilization Plan, 1924, is in general much more satisfactory in its provisions than was the 1923 plan. However, I am constrained to stress again, under this heading of this report the situation as it now exists with respect to the mobilization of Coast Artillery units, as above set forth under "Personnel"—"Enlisted Strength."

While the requirements set forth with respect to all the various activities of the Coast Artillery Corps are of prime importance, the situation regarding our antiaircraft defense is considered more vital at this time than that of any other.

A determination of the requirements for antiaircraft defense in case of a major emergency and initiation of a program to insure the availability of personnel and materiel to meet these requirements is a most vital and pressing matter. The requirements can be determined only after receipt of Corps Area defense projects. The work of preparing these projects should be expedited. As soon as they have been submitted to and approved by the War Department, steps will be initiated by this office, looking to the necessary changes in the War Department Mobilization Plan, including necessary changes in the strength of the regular Coast Artillery Corps in addition to those recommended above under "Personnel"—"Enlisted Strength," to provide the personnel found to be necessary, and looking to the adoption of a program for manufacture of materiel to insure its availability in proper quantities in the event of mobilization.

Very respectfully,

F. W. COE

Major General, United States Army,
Chief of Coast Artillery.

To the Secretary of War.

Notes on the Dardanelles Campaign of 1915

By MAJOR SHERMAN MILES, G. S.

FOREWORD

THANKS to the kindness of Admiral Mark L. Bristol, U. S. Navy, I have been able to make four trips to the Gallipoli battle-fields, twice under British and twice under Turkish guidance. I have also received from the Turkish General Staff both published and unpublished information on the disposition and strength of their troops at certain critical periods of the Campaign, and from the Historical Section of the British General Staff similar data on their troops. I am greatly indebted to General Sir Ian Hamilton for copious comments, which I have used in revising my manuscript and as footnotes.

These sources of information, and a study of the standard books on the Campaign are the basis, and must also serve as the excuse for the following notes.

They are notes on what appear to be the salient points of the Campaign, and are in no way intended to present even a condensed story of that long and tragic struggle.

GENESIS

In the genesis of a campaign often lies the secret of its revelations.

The Dardanelles Campaign seems to have been conceived in the brain of Winston Churchill, First Lord of the Admiralty. At least he was its principal advocate. Essentially the idea was to use Allied sea power to turn the southern flank of the Central Powers, to cut Turkey out of the war, to open up direct communications with Russia, to strengthen the Alliance by exchanging Western munitions for Russian grain, to line up Italy and the Balkans on the Allied side, to keep the Near East and India quiet, and to tighten the blockade of the Central Powers.*

As a strategic conception it is hardly open to criticism. Slavish insistence on the principle of the objective might have condemned it, seeing that the German Army and High Sea Fleet were unquestionably the enemy's main forces. But by the winter of 1914-1915 the German Army was securely entrenched in Northern France and

*Note by General Hamilton: "An excellent and comprehensive summary."
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Belgium, and the High Sea Fleet lay in impregnable harbors. The Western Allies could get at neither the one nor the other. As events turned out, the German position was so strong that the initiative in decisive action rested with them, both by land and by sea, for over three years to come. But, though the Western Allies could decisively defeat neither of the enemy's main forces, their eventual ability to do so depended largely on the pressure which Russia could bring on the Eastern front, and that in turn on the supply of munitions to Russia. This was not widely realized at the time, and Russian grain loomed larger in Western eyes than her increasing need for munitions; but that does not affect the strategic value of the opening of the Dardanelles. Its value was greater than was then realized.

The Western Allies held in their hands a surplus power at sea, and some available troops, which meant that they could move rapidly and with a certain amount of secrecy to any coastal zone in enemy territory and there land troops in combined operation with their warships. For the time being application of the first principle of war, that of the objective, was denied them; but, thanks to their sea power, they still held in their hands possibilities of the offensive, of maneuver, of cooperation, of surprise and of security. These they attempted to apply in the Dardanelles Campaign; and, in view of the strategic situation and possibilities at that time, it may be contended that the campaign also conformed to the broadest conception of the principles of economy of forces and of simplicity of movement. If ever "*a way around*" was justified in the strategic field, that way lay through the Dardanelles early in 1915.

* * * *

The earliest discussions on the Dardanelles idea occurred in the month of September, and again in November, 1914. They came to nothing. On the 3rd of November, three days after Turkey declared war, Admiral Carden, commanding the fleet off the Dardanelles, bombarded, by direction of the Admiralty, the outer forts at the Dardanelles. That also amounted to nothing, except as a preliminary warning to the Turks.

On January 2, 1915, writes Winston Churchill, "Lord Kitchener came over himself to see me at the Admiralty, and we had a full discussion." Russia had appealed to her Western Allies for some action against the Turks. "He (Kitchener) returned steadily and decisively to the statement that he had no troops to spare, and could not face large new expansion of our military commitments." That put the Army out of it.

Nevertheless, on the following day the British War Office cabled the Russian Government that a demonstration would be made against Turkey. But Mr. Churchill thought little of demonstrations. He promptly cabled Admiral Carden: "Do you consider the forcing of the Dardanelles by ships alone a practical operation? It is

assumed older battleships fitted with mine-bumpers would be used, preceded by colliers or other merchant craft as mine-bumpers and sweepers. Importance of results would justify severe loss." The Admiral submitted a plan by cable, which was approved on January 13th by the War Council, on which Lord Kitchener sat. Again I quote Mr. Churchill: "The decision of the Council was unanimous, and was recorded in the following curious form—"That the Admiralty should also prepare for a naval expedition in February to bombard and take the Gallipoli Peninsula, with Constantinople as its objective."

"A naval expedition" to "take the Gallipoli Peninsula," a rugged stretch of land 12 miles by 47! And in the Carden plan, which was one of progressive reduction of the Turkish defenses ("might do it all in a month about," thought the Admiral), there is no mention of troops, even for subsidiary purposes!

The decision of January 13th was confirmed on the 28th by the same Council, this time in spite of the obvious dissent of Admiral Fisher, the First Sea Lord. "Lord Kitchener considered the naval attack to be vitally important," runs the record of the Council, "If successful, its effect would be equivalent to a successful campaign fought with the new armies. One merit of the scheme was that, if satisfactory progress was not made, the attack could be broken off." Up to this point it was a purely naval project, and of limited commitment.

Here at the outset were two very questionable doctrines. Ships have successfully run by coast defenses, notably in our Civil War, and many naval authorities were not prepared to admit that it could not be done again. But deliberate and progressive reduction of heavy land batteries and minefields is quite a different matter. To engage ships against forts in open fight in narrow waters is a procedure which had been condemned by the highest naval opinion for a generation. Yet in this case the Admiral proposed to reduce the Dardanelles' defenses with a force of three modern battle-cruisers and 12 old battleships, and the Sea Lords at the Admiralty, giving him a dreadnaught and two pre-dreadnaughts in lieu of two battle-cruisers, approved his plan. "No one," writes Winston Churchill, ". . . said, 'This is absurd. Ships cannot fight forts'."

As to the theory of limited commitment, it is obvious that that is not the basis on which so important an operation should rest. Half-hearted measures would but lead to disaster, as the British were soon to realize.

On the eve of the naval attack the Admiralty had qualms of doubt about the Carden plan. Later on most of the naval authorities testified that they had been opposed from the first to an attack by warships alone. Not until the 15th of February, however, over a month after the naval attack had been authorized, did the Admiralty

put in a strong plea for land forces. "The naval bombardment," says its memorandum of that date, "is not a sound military operation unless a strong military force is ready to assist in the operations, or at least to follow up immediately the forts are silenced."

The next day, February 16th, it was decided to send the 29th Division from England to Lemnos, and "a force from Egypt if required." These troops were "to be available in case of necessity to support the naval attack on the Dardanelles"—which began three days later. This was a critical decision, and for the first time clearly envisaged the use of a considerable land force. But, says Winston Churchill, "when we met in Council again on the 19th, it became clear that Lord Kitchener had changed his mind. He informed us that he could not consent to the despatch of the 29th Division to the East." Churchill pleaded for it in vain. Kitchener was not to be moved—he was then not only Field Marshal and Secretary of State for War, but virtually Commander-in-Chief and General Staff as well.

On February 25th Admiral Carden suggested that 10,000 men be landed on the tip of the Gallipoli Peninsula at once, but he was given to understand that he was to force the Straits without military assistance. Nevertheless, the theory of limited commitment, the idea of withdrawing if the naval attack proved unsuccessful, seems to have been abandoned about this time.

Two more weeks pass. The naval attack continues. "On March 10th Lord Kitchener . . . announced to the War Council that 'he felt that the situation was now sufficiently secure to justify the despatch of the 29th Division'." From that moment the land attack became a practical certainty, although it was not definitely decided on until the 22nd of March, in the cabin of the *Queen Elizabeth*. The arrival of General Hamilton at the Dardanelles happened to coincide with the disastrous naval attack of March 18th, in which the Allies lost three capital ships sunk and three badly damaged. That finally tipped the scales. The Navy fell back in support; the Army took up the fight.

"We drifted into the big military attack," says General Callwell, the Director of Military Operations. "Drifted" just about describes it. Fifty-eight days elapsed between the decision of the War Council to attack with the fleet alone and the assignment of General Hamilton as Commander-in-Chief of the Expeditionary Force. Those 58 days of hesitation correspond very closely to the period of 65 days which elapsed between the beginning of the naval attack and the landing of the troops. They measure the lack of synchronism in the combined operations and the period of definite warning given the enemy.

Nor were the British content to warn their enemy by naval attack alone. They actually landed or threatened to land troops

long before the Army was put ashore on the 25th of April. Demolition parties were landed near the outer forts on February 26th and 27th, March 1st, 3rd and 4th. "Instead of being planned as a surprise—the essence of a sea attack—the campaign had been heralded as few have ever been," says the historian of the Australians. "No condition designed to proclaim it seems to have been omitted."

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Now let us turn to General Hamilton's diary. He is writing on the 14th of March. "Neither the Asquith banquet, nor the talk at the Admiralty that midnight had persuaded me that I was going to do what I am actually doing at this moment. K. (Kitchener) had made no sign nor waved his magic baton. So I just kept as cool as I could and had a good sleep. Next morning, that is, the 12th instant, I was working at the Horse Guards when, about 10:00 a. m., K. sent for me. I wondered! Opening the door I bade him good-morning and walked up to his desk where he went on writing like a graven image. After a moment, he looked up and said in a matter-of-fact tone, 'We are sending a military force to support the fleet now at the Dardanelles, and you are to have command.' . . . Although I had met K. almost every day during the past six months, and although he had twice hinted that I might be sent to Salonika, never once, to the best of my recollection, had he mentioned the word Dardanelles. . . . Wolfe Murray, the Chief of the Imperial General Staff, was then called in, also Archie Murray, Inspector of Home Forces, and Braithwaite. This was the first (apparently) either of the Murrays had heard of the project!!!" The next day General Hamilton left England for the Dardanelles.*

The Dardanelles military expedition ran true to form. Created off-hand by the word of Lord Kitchener, it continued to the end on the hit-or-miss principle. The first transports came in with their loads in hopeless confusion. Guns and shells were always wanted, never received systematically or in adequate quantities. New divisions were sent out below war strength, while the seasoned units dwindled away for lack of replacements. The base at Alexandria remained under a general coequal in authority with Hamilton, and intent on his own Egyptian show. The whole service of supply was a constant source of worry. The expedition remained to the end an illegitimate child, importunate in its demands and annoying by the very fact of its existence.†

* * * * *

The genesis of the campaign, from the Turkish side, was hardly more promising. Not until the naval attack had demolished the

*Note by General Hamilton: "The very moment the mere possibility of a landing was envisaged I should have been sent post haste to the scene to work out plans and advise. Of all the lessons of how not to do it, K.'s way of fixing up the chief command was the worst. Lincoln's positively shines by comparison. I was selected (I have reason now to believe) some time previously, but was not so informed."

†Note by General Hamilton: "This hits the bulls-eye.."

outer defenses of the Dardanelles, late in February, were the two Turkish divisions at the Dardanelles, the 7th and 9th, reinforced by two more divisions. Up to the 25th of February, says a Turkish General Staff report on the campaign, "it would have been possible to land successfully at any point on the Peninsula, and the capture of the Straits by land operations would have been a relatively easy affair."

"At the end of February," General Liman von Sanders writes, "Turkish G. H. Q. firmly believed in the possibility of forcing of the Straits by the enemy fleet. Everything had been prepared for the departure of the Sultan, his court and his harem, as well as the civil and military authorities. . . . The military measures which G. H. Q. drew up between the 20th of February and the 1st of March would have been fatal. . . . They prescribed that, in case the Straits were forced by the enemy fleet, the 1st Army should have the mission of defending the north side, and the 2nd Army the south side of the Straits and the Sea of Marmora. . . . As to a defense of the outer shores of the Gallipoli Peninsula, bordered by abrupt heights, and of the shore of the Asiatic side of the entrance of the Dardanelles, this was simply renounced." On the 1st of March the 2nd Army Corps at Adrianople and the 4th Army Corps on the Panderma-Balikesri railroad were ordered in towards Constantinople. "It was precisely the 2nd and 4th Corps which constituted the large units nearest the Dardanelles, those which would have been first called on in case the enemy debarked." General Liman protested to the German Ambassador and to the Chief of the Military Cabinet of the German Emperor, and the troops were not moved.

Meanwhile the Allied naval attacks, begun on February 19th, continued, and "information became more clear on the formation of a powerful expeditionary corps with a view of debarkation."

On the 24th of March, six days after the great naval attack (which proved to be the last), "Enver Pasha at last decided to form a special army, the 5th, for the protection of the Dardanelles . . . Late in the afternoon of March 24th Enver telephoned me to ask me to remain in my office until he came. He arrived shortly afterwards and asked me if I were disposed to take command of the 5th Army newly constituted at the Dardanelles. I accepted immediately, but I told him that he had not an instant to lose in reinforcing as rapidly as possible the troops already there."

The next day General Liman left Constantinople for the Dardanelles. Thanks to the wretched loading of the Allied transports, which brought about their withdrawal and their reloading at Alexandria, and to the delay in sending the 29th Division, just one month was given the German General in which to make his plans and prepare his defenses before the campaign began. He gives one to under-

stand that it was that month under his direction which saved the Turkish Army on the Gallipoli Peninsula from defeat.

It may have been. We know as yet very little about the Turkish plans and orders for the defense of the Straits. Certain it is that General Liman's assignment to command corresponded with a general Turkish reorganization which materially increased their forces at the Dardanelles, and that his arrival at Gallipoli was the signal for a drastic change from a rigid system of beach defense to one of tactical reserves.

On the other hand, in the month and more between the beginning of the naval operations and the arrival of General Liman the Turks apparently did a good deal to defend the Peninsula. Their nocturnal spade-work impressed General Hamilton as early as the 17th of March, the day he reached the Dardanelles.

* * * *

In spite of the possibilities in initiation and surprise which their command of the sea gave the Allies, the defense had the greater advantage at Gallipoli. The terrain was all in its favor. There are comparatively few good landing places. The country is rough and difficult and the slopes generally steep.

The greatest advantage of the defense lay, naturally in its shorter communications. It is but little over 100 miles by sea from Constantinople to the Dardanelles. This was the principal Turkish line of communication.

Railroads were somewhat distant. The nearest point on the Thracian railroad, Uzun Keupri, was 65 miles by road from Bulair. Turkish roads are notoriously bad, but this one happened to be a good military *chaussee*. Crossing the isthmus it ran on the Saros side, and consequently lay under the guns of the Allied warships. During the campaign a cut-off had to be constructed along the Marmora shore.

On the Asiatic side of the Straits, the nearest railhead was Balikesri, 100 miles by dirt road from Chanak. In this district there were no paved *chaussees*, but a fair road ran from Karabigha, on the Marmora, to Chanak, a distance of 60 miles. This could be cut to 40 miles by using Lapsaki instead of Chanak as the point of shipment across the Straits.

There were therefore three Turkish lines of communication: (1) By sea from Constantinople; (2) by rail to Uzun Keupri and thence by *chaussee* down the Bulair Isthmus; (3) by rail and road on the Asiatic side and thence across the Dardanelles. The sea communications, both direct to the Straits and via Karabigha, could be attacked by submarines, but as events showed they could not be severed. The Bulair route could be cut by a hostile descent on the isthmus. Were enemy guns installed on the isthmus they might cut the direct sea communications to the Straits, at least by day. But

the capture of the isthmus would not cut the sea route via Kara-bigha. Lastly, the rail and road communications into Asia and the ferry service across the Straits were practically beyond the possibilities of enemy attack, except by air.

The Allied lines of communication were the long sea lanes from southern France and England. Their main base was established at Alexandria, in Egypt—which lengthened still more the overseas distances. The naval base at Malta served them to a certain extent. They also had one advantage that rarely falls to the lot of an overseas expedition, a well placed advanced base secure from enemy attack. The land-locked harbor of Mudros on the Greek island of Lemnos, 60 miles from the tip of the Gallipoli Peninsula, though lacking at first in all port facilities, afforded an excellent natural advanced base. Tenedos, Imbros and Mytilene were also used to great advantage by the Allies. This group of islands, ranging from 15 to 100 miles from the landing beaches on Gallipoli, were of great value to the Allies throughout the campaign.

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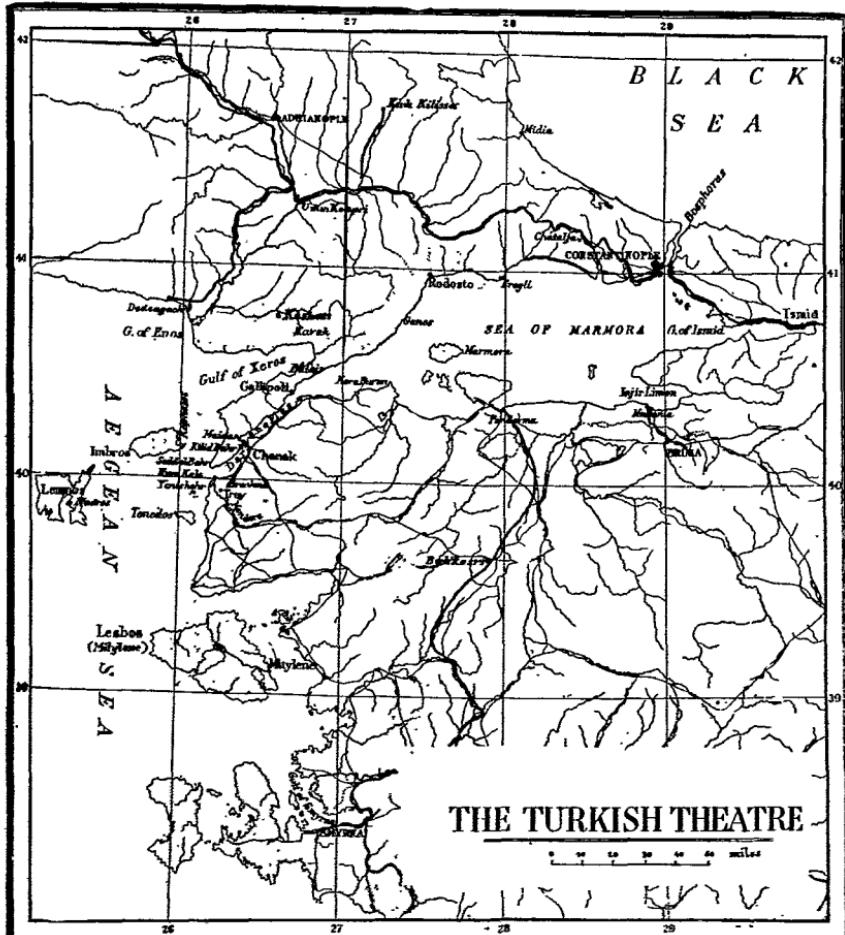
The Turks had a great potential advantage over the Allies in that they were not seriously engaged on any other front during the campaign, except in far-away Mesopotamia. They had only to guard their short Bulgarian frontier, resist any Russian attack in the Caucasus, check the small Anglo-Indian Army advancing on Bagdad, see that the British did not cross the Sinai desert into Palestine, and garrison their own territory. None of these was a difficult task, and all of them together constituted a drain on Turkish military resources incomparably less than that put upon the Allies by the presence of the German Army in northern France.

In March, 1915, the Turks probably had about 450,000 men under arms, and their forces increased during the spring and summer. Nothing but mismanagement and undeveloped transportation prevented them from assembling an army at Gallipoli several times as large as the Allies'. The demands of the main theater of war were such that the Allies never felt justified in raising their forces at Gallipoli above 110,000 effectives, and they attained that figure only for a short period in July-August. But they counted on the Turkish inability to assemble and maintain a greatly superior force, and events proved them right. It is doubtful if the 5th Turkish Army ever exceeded 125,000 effectives, and in neither of the critical periods of the campaign, April and August, did the Turks assemble equal forces to oppose the Allied attacks when they were launched.

* * * *

Both sides had to make the most of defective organization of command. On each side a general and an admiral were coequal. On the Turkish side the command on land was further divided between General Liman, commanding the 5th Army, and Admiral von

Usedon, commanding the "Fortress of the Dardanelles." Liman's personality counted strongly against good cooperation. He did not get on well with the Turks, and there was considerable friction between him and von Usedon. But they were both German officers almost alone in a foreign army, and force of circumstances drove them together. Also they had the great advantage of having a



single and all-powerful head—and German trained at that—fairly close behind them. Furthermore, Gallipoli was vital to Turkey—no other front mattered in comparison to it.

The British pair, Hamilton and de Robeck (Admiral Carden's successor), had only personality in their favor. They worked together well, considering their mutual independence. Each scrupulously, perhaps over-scrupulously, avoided meddling in the other's province. Their greatest handicap lay in the fact that, far away in London, the British Cabinet was engrossed in the greater operations

going on at their doors. French General Headquarters, at grips with the German Army, also had to be consulted.* There was no one supreme head interested primarily in the Dardanelles who could run down to that front over night, as Enver Pasha could and did. And for three distressing weeks in May-June, when the British Cabinet was in dissolution, there was practically no head at all.

Even more than the Turks, the Allies needed unity of command. Admiral de Robeck was Commander-in-Chief of the Allied fleet. General Hamilton held supreme command over the Anglo-French troops (subject, of course, to tactful handling of the French generals); but when it came to air forces, and even to his own base in Egypt, his control was only partial. Worst of all, neither he nor de Robeck held the supreme power which was necessary to force combined action of the Army and the Fleet. The campaign cried aloud for combined action. Admiral Wemyss, Commodore Keyes and other officers of the Fleet urged it again and again. Winston Churchill, whom the Army as well as the Fleet regarded as their best friend and main stay, urged it in the Cabinet and out of it. But, after it had been decided to land the Army, he could never bring the Sea Lords at the Admiralty to the point of ordering de Robeck to renew the naval attack. And yet combined operations were the obvious and almost necessary solution. Old battleships and new monitors, fit for hardly any other service and manned by relatively few men, were kept out of the fight while thousands and thousands of lives were sacrificed on land—in vain.

Had either the General or the Admiral been given supreme command and the responsibility for forcing the Straits, it is probable that, in spite of natural reluctance to overrule the technical advice of a sister service, the Fleet and the Army would not have been beaten in detail. The Admiral would hardly have spared the Fleet had full responsibility for success rested upon him; nor would the General have spared it had he held supreme command.†

THE PERIOD BEFORE THE LANDING

The seacoast defenses of the Dardanelles consisted of three groups of forts and batteries, the outer, intermediate and inner. The outer defenses consisted of three groups of batteries (12 heavy‡ and four light guns in all) on the southern end of the Peninsula, and two groups of batteries (nine heavy and two medium guns in all) on the Asiatic shore opposite. Of these guns, but four were modern.

*Note by General Hamilton: "In fairness to the French and to the Brit'ish in France, it must be said it was expecting too much of men who were within rifle shot of enemy masses to weigh dispassionately the claims of Gallipoli to reinforcements or munitions. And all the Powers of the Army, all the old War Office Chiefs, all the General Staff had been allowed to run off to gather laurels on the Western Front."

†Note by General Hamilton: "Correct."

‡Heavy calibers 8.2-inch-14-inch; medium calibers 4.7-inch-5.9-inch; light calibers 1.8-inch-3.4-inch.

The intermediate defenses consisted of batteries on both shores, from a point three miles inside the Straits to two miles below the Narrows. On the European shore there were 14 batteries, mounting 10 heavy howitzers, 22 medium howitzers and mortars, 15 medium guns, and 21 light guns and howitzers. On the Asiatic side there were 13 batteries, mounting eight heavy howitzers and mortars, eight medium guns, 16 medium howitzers and 24 light guns.

The inner defenses consisted of batteries grouped on both sides of the Narrows. On the European shore there were five battery groups, mounting 30 heavy guns (including two 14-inch), six medium guns and three medium howitzers. On the Asiatic side there were six battery groups, mounting 31 heavy guns (including four 14-inch), six heavy mortars, eight medium guns and four medium howitzers.

The inner and outer defenses had been installed before the war, and were mostly old pieces. Of the 30 batteries of the intermediary defenses, 23 had been installed since the declaration of war in November. They were in hastily constructed emplacements and many of them were mobile batteries.

There were 10 lines of submarine mines anchored in the five-mile stretch from the Narrows down. In all there were 377 mines in this part of the Straits, the average width of which is two miles. In addition, 20 mines were secretly anchored in Erenkeui Bay on March 8th. It was these latter which caused such havoc on March 18th. All these mines were contact, and all were under the fire of the intermediary and inner defenses. There were also about 40 small floating mines which had been sent down from Constantinople. A Turkish General Staff report states that both anchored and floating mines contributed largely to their success on the 18th of March.

There were three 18-inch torpedo tubes, with two torpedoes each, mounted on the pier at Kilid Bahr. They were quite conspicuous and easy to attack. The defenses were also provided with six stationary and six mobile searchlights. There were practically no defenses of any kind above the Narrows.

* * * *

It is extraordinary that the Turks should have left undefended the long stretch of water from the Narrows to Gallipoli Strait. From the beginning of the naval attack on February 19th to the evacuation of Anzac 10 months later there was always the possibility that the Narrows would be forced or the heights dominating it be captured—which would have meant much the same thing. Yet in all that time the Turks had made no provision for the defense of the upper reaches of the Dardanelles. It is true that they could not have denied that water to British mine sweepers by means of permanent seacoast batteries. But they could have defended it by the fire of mobile howitzers and guns concealed in the rolling country

on both sides. And the great mass of the Gallipoli Peninsula above Gaba Tepe—Kilia is much more defensible against a land attack than is the southern end.

Although they planted nearly 400 mines in the Narrows and below it, the truth seems to be that they had none for the upper Strait, and could not get them. They could not manufacture large anchored mines, though they did make about 40 small floating ones, probably of doubtful value. They could get no material through from Germany and Austria until Bulgaria came into the war in early October.

* * * *

Admiral Carden planned a progressive attack, the principal phases of which were:

- (1) Reduction of the outer defenses.
- (2) Reduction of the intermediate defenses and sweeping of the lower lines of mines.
- (3) Reduction of the inner defenses.
- (4) Sweeping the mine-fields in the Narrows.

"In dealing with the forts," says the Official Naval History, "the general principle was to be an attack in three stages—first, a long range bombardment (direct or indirect) out of range or bearing of the enemy's guns; secondly, a bombardment at medium ranges, using secondary armament and direct fire; and, thirdly, the final reduction of the forts by an overwhelming fire at decisive ranges of from 3000 to 4000 yards."

The naval operations began on February 19th, with a heavy bombardment of the outer defenses. Five days of bad weather followed during which nothing could be done. On the 25th and 26th the bombardment was renewed and the outer defenses practically destroyed. The ships closed to very short ranges, 2000 yards and less, and demolition parties were landed. Then came two more lost days. On the 1st of March and the seven succeeding days the intermediary and the inner defenses were bombarded, both by direct fire from the Straits and by indirect fire from across the Peninsula. Unsuccessful attempts were also made to sweep the mine-fields by night. A lull of 10 days followed, caused not by the weather this time, but by the increasing accuracy of the plunging fire from concealed guns and howitzers. Without effective airplane reconnaissance and spotting the Fleet could not deal with this fire. The bombardments had also shown that long range fire from the ships could not destroy the forts. The Fleet would have to close to decisive range, and closing was impossible while the enemy's mines remained intact. Night sweeping, supported by battleships was the answer, but the sweepers were slow and the current strong. Furthermore, the sweepers were manned by civilians—fishermen unused to battle

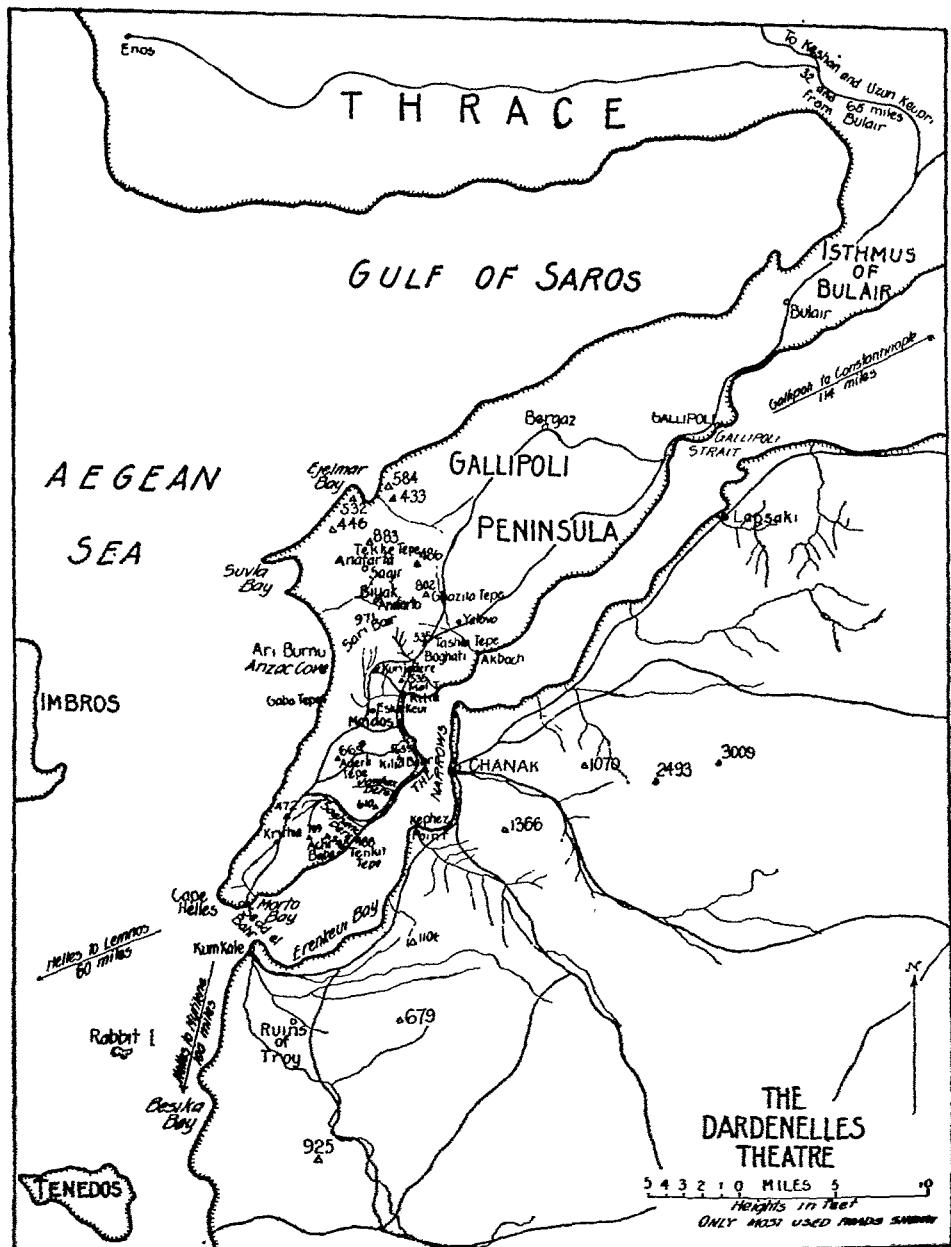
or naval discipline. Also there was some anxiety about the supply of ammunition. Operations lagged.

On the 11th Winston Churchill sent a telegram intended to spur the Admiral on to more vigorous action. Carden agreed, but on the 16th he fell ill and was relieved by Admiral de Robeck. On the 18th the great attack was made.

In successive divisions the Fleet penetrated to within 9000 yards of the forts at the Narrows, rather more than half way up from Sedd el Bahr. They engaged the inner defenses. The mine sweepers were ordered to advance and sweep the channel under cover of the battleships' fire. The forts were apparently dominated by the ships. A Turkish General Staff report says that "by 2:00 p. m. the situation had become very critical. . . . All telephone lines were cut, all communication with the forts was interrupted, some of the guns had been knocked out, others were half buried, others again were out of action with their breech mechanism jammed; in consequence the artillery fire of the defense had slackened considerably." But before the mine-fields could be attacked the Fleet itself had sustained severe losses and conceived itself to be in the midst of floating mines. After the third capital ship had been struck, and seven hours after the attack began, the Admiral hoisted the "General Recall." The great naval attack had failed.

In their 12 actions against the forts, including the attack of March 18th, the ships had fired 2100 heavy and about 5500 medium caliber shells. In the March 18th attack, according to the Turkish General Staff, the fortifications sustained the following casualties: "Four officers and 40 men killed, 70 wounded, eight guns damaged and some ammunition depots and barracks destroyed."

The Allied Fleet might possibly have forced the Straits had it returned to the attack the following morning. There is considerable testimony from the Turkish side, from Enver Pasha down, to bear this out. "In the attainment of such an important objective," says a Turkish General Staff report, "disregarding comparatively small losses, the enemy should have repeated his attacks with great force, and in all probability he would have succeeded in forcing the Straits by sea." The Fleet had by no means destroyed the seacoast batteries (except in the outer defenses), and still less the mobile howitzers hidden behind the hills; but the last attack had very much demoralized the Turkish garrisons and exhausted the greater part of their ammunition. "In Fort Hamedie," says a Turkish General Staff report, "there were but five to 10 rounds left, and the batteries on the European side were equally low. . . . But we worked all night of the 18th-19th, redistributing ammunition and by morning we could have continued action." But even the German officers present had, apparently, little hope of successful resistance if the Fleet continued its attack.



Winston Churchill says: "We (presumably the Admiralty) suspected at the time (about March 18th) the weakness and critical conditions of the Turkish defenses against the Fleet." He drafted a cable ordering a renewal of the attack, but did not send it because of the opposition of the Sea Lords. Commodore Keyes, de Robeck's Chief of Staff, said a few days after the attack that he "had never felt so possessed of the power of the Navy to force a passage through the Narrows as in the small hours of the 19th when he got back to the Flagship after trying in vain to save the *Ocean* and the *Irresistible*."

But Admiral de Robeck had undertaken the Carden plan for progressive reduction of the forts, and so far as he could see the reduction on March 18th had been very largely on his side. Three capital ships sunk in waters which were supposed to have been cleared of mines, three more seriously injured by mines and gunfire—one-third of his total force of 18 capital ships out of action—such were the staggering results of that day. He thought himself confronted by a new danger, floating mines, carried down the Straits by the current. As a matter of fact his ships had run onto mines in Erenkeui Bay which the Turks had secretly anchored at night, but this he did not know.

He did know, however, that his defeat on the 18th had been due to mines. Whatever may have been the effect of his bombardment, moral or material, the mines were still intact. His mine sweepers were not powerful enough to sweep rapidly against the current of the Dardanelles.* The paravane had not yet been developed. He could not reasonably expect to get through the Straits with sufficient force to overcome the Turk-German fleet and capture Constantinople.

Right on top of these serious losses and reflections came General Hamilton, just out from England, full of enthusiasm, his transports crowded with eager troops and waiting only an intimation from the Fleet to take a hand, even the leading hand in the game. So on the 22nd of March, in the cabin of the *Queen Elizabeth*, the Admiral threw down his cards. It was natural, considering the effect which his heavy losses must have had on him. And it was right, up to a certain point. There was an army ready to cooperate. Why shouldn't it cooperate?

The fatal mistake lay not in asking the Army to cooperate, but in failing to cooperate with it by combined attack. In that conference on the *Queen Elizabeth* Admiral de Robeck gave no hint that thereafter the whole burden of the fight would fall on the Army, that the Fleet was thenceforth to function only as a convoying and bombarding adjunct to the troops. As a matter of fact, he had not

*Note by General Hamilton: "This was the real snag. Nor were the crews 'for it.' They were just ordinary fishermen. The destroyer force of sweepers created afterwards by Keyes was quite another affair."

then decided to limit the Fleet to so secondary a role.* Certainly General Hamilton did not suspect that naval cooperation would be so limited, and to a large extent his plans during the following month were based, as we shall see, on the assumption of a combined attack with the Fleet.†

The naval operations, considered as a means of forcing the Straits by ships alone, were unsound in theory and unsuccessful in practice. But at least they had shown that, in spite of all handicaps, the ships could go to the edge of the mine-field and there engage, with considerable effect, even the inner defenses. Most important of all, they had shown that the Fleet could force the enemy to engage numerous field batteries in the defense of his all-important mines. Once the Army was ashore the Fleet could have materially aided it by drawing off these Turkish field batteries.

From the 25th of April, when the Army landed, to the appearance of the German submarine three weeks later, the Fleet might well have resumed its attack on the Straits. The losses of the 18th of March in capital ships had been promptly made up. The mine sweepers had been reinforced from England by 38 powerful trawlers, capable of sweeping upstream at 14 knots, and 24 destroyers fitted as sweepers. The crews of the sunken battleships, disciplined sailors instead of civilian fishermen, had been put on the sweepers, and "an incomparably superior sweeping force had been organized." A naval airdrome had been established on Tenedos and a small air force assembled. In short, the Fleet was better prepared to attack when the Army landed than it was when it undertook to force the Straits alone.‡ But no attack was made.

* * * * *

At the conference on March 22nd, General Hamilton was faced with a grave decision. Should he land at once, or should he await the arrival of the 29th Division and the reorganization of his transports? The temptation to land immediately was very strong. So he might cover the naval defeat of the 18th, take advantage of whatever demoralization the great naval bombardment of that day had caused in the enemy's ranks, and, above all, cut short the Turkish concentration and defensive preparations on the Gallipoli Peninsula. "We might sup tomorrow night on Achi Baba," he wrote on the 22nd. "With luck we really might." Had he been able to get his troops ashore at all, he might possibly have supped wherever he liked, even on the plateau of Kildi Bahr. He had with him 34,000 men and 40 guns. On the other hand the Turks had but two regi-

*Note by General Hamilton: "Probably true. I must not name my authority, but I have been told quite lately and quite positively by one in the know that the reason which actually decided the Admiral to throw down his cards, to bring the Army in, was that he had learnt my plan was *not* for Bulair, but to land at Helles, where I would be directly supporting the Fleet in its attempts to get through—which, however, were never destined to be made."

sweeping was half the battle."

†Note by General Hamilton: "Correct."

‡Note by General Hamilton: "All true. The Fleet was twice as strong, and the mine

ments (9th Division) and nine batteries strung out in a thin line from Ejelmar Bay to Cape Helles, while the 19th Division (three regiments and three batteries), newly formed and not completed, lay in reserve near Maidos and Kild Bahr. That was all on the southern end of the Peninsula—perhaps 12,000 men, with nothing to give them rapid support except the third regiment of the 9th Division across the Straits at Chanak. And the Turkish defense had not then been reorganized and put on a sound basis by General Liman von Sanders and his German officers. But this of course General Hamilton did not know.

The reasons against an immediate landing were very strong. Lord Kitchener in his written instructions had said: "Before any serious undertaking is carried out in the Gallipoli Peninsula all the British military forces detailed for the expedition should be assembled so that their full weight can be thrown in." The 29th Division, Hamilton's one unit of regular troops, had not yet arrived—it was three weeks late. The Anzac Army Corps, except one infantry brigade, was still in Egypt. The transports he had with him had been loaded without thought of a rapid and orderly debarkation of men and material on a hostile coast. His base at Mudros afforded no facilities whatever for unloading or redistribution. He also notes: "No detail thought out, much less worked out or practiced, as to form or manner of landing; lack of gear (naval and military) for any landing on a large scale or maintenance thereafter; unsettled weather."*

He decided to withdraw his transports to Egypt, reload, give his troops more training and await the arrival of the 29th Division. "The Admiral," he writes on the 22nd, "undertakes to keep pegging away at the Straits while we in Alexandria are putting on our war paint. He will see to it, he says, that they think more of battleships than of landings." And the Admiral did—practically nothing. His desultory fire on Turkish trenches, wire and bridges only served to warn the enemy of the coming land attack.

So the first great chance was lost—lost before it presented itself, lost when the Admiralty approved the Carden plan of progressive reduction of the Straits before the Army was ready, lost when Kitchener tied Hamilton to the much-delayed 29th Division, lost for lack of landing plans and proper care in loading the transports. The naval operations should not have been allowed to lag after March 8th. The Fleet was no less capable of renewing the attack on the 9th than it was on the 18th. The great attack of the 18th should never have been allowed to lapse into more than five weeks of inactivity. A little more hardy determination on the spot, a little more consistent foresight in London, and Constantinople would probably have fallen before the end of that month.

*Note by General Hamilton: "No arrangements for evacuation and treatment of wounded. My principal medical officer and all his staff doctors did not arrive at Alexandria until April 1st, nor did my Administrative Staff, A. G.'s and Q. M. G.'s"

Smoke and the Coast Artillery

By MAJOR WILLIAM N. PORTER, C. W. S.

IN "The World Crisis,"* which is Mr. Winston Churchill's account of his conduct of the British Admiralty during the World War, appears this paragraph:

Closely allied to the problem of finding ways of attacking by sea and land lay the great subject of Smoke. To make an artificial fog which would blanket off a particular area so that men or ships could traverse it or occupy it without the enemy seeing where to shoot at them, was a second most simple and obvious expedient. Smoke was the ally and comrade of the Steel Plate. They went forward together each helping the other, and multiplying their joint effect.

And behind smoke lay a more baleful development—Poisonous Smoke: smoke that would not only obstruct the vision, but destroy the eye, smoke that would not only blindfold the machine gunner but strangle him.

Mr. Churchill was interested in smoke developments from the very beginning of the War; and this interest was doubtless heightened by his contact with Lord Dundonald, who placed at his disposal the secret papers of his grandfather (the famous Admiral Cochran) which had to do with smoke and poisonous fumes and their use in attack of fortifications.

When the packet with the long kept Cochran secret, was at last placed in Mr. Churchill's hands, he found on the inner covering, in the delicate writing of the old Admiral, these words:

To the Imperial mind, one sentence will suffice: All fortifications, especially marine fortifications, can, under cover of dense smoke, be irresistibly subdued by fumes of sulphur kindled in masses to windward of their ramparts.

Says Mr. Churchill, "The reader, captivated by the compliment, will no doubt rise to the occasion and grasp at once the full significance of the idea." The Coast Artillery reader will have no trouble in grasping it.

Leaving out entirely the question of poisonous or toxic fumes, the use of smoke for protection is as old as war itself, and dates back to the days of the Israelites and their troubles in Egypt. From that time it has figured more or less prominently in the World's battles, both military and naval.

*Published by Charles Scribner's Sons. New York City.
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The smoke from black powder assumed such proportions in the 15th century that the use of controlled smoke was practically abandoned; and this condition existed as long as black powder was the propellant for projectiles.

Smokeless powder was first adopted by an army when the French produced it in 1885; and within a few years the propellants used by all the armies of Europe were smokeless. The controlled use of smoke, either offensively or defensively, was not considered in the Russo-Japanese or Spanish-American Wars. Soldiers contented themselves with the darkness and fog which nature pro-

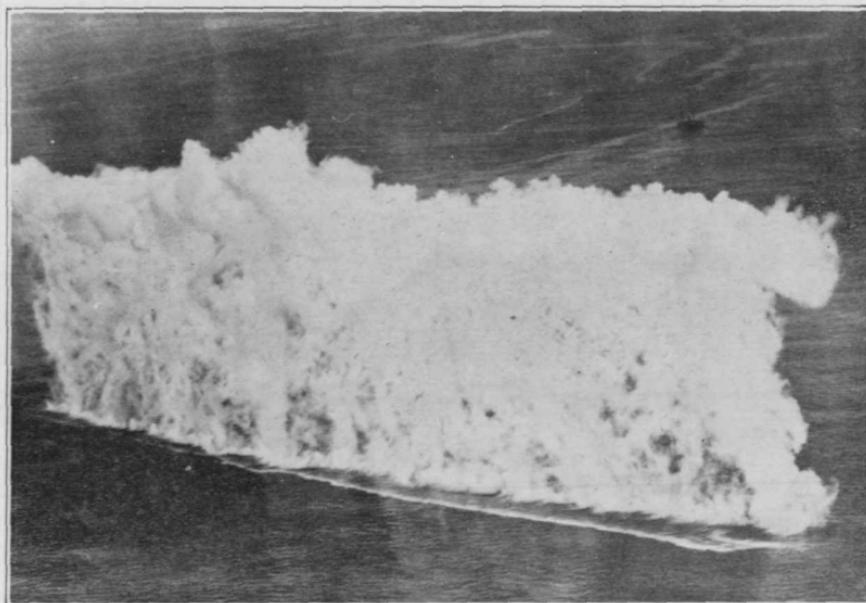


vided for them. Navies made use of smoke curtains caused by over stoking the fires of light vessels, and similar means. The necessity for screening concentrating movements in the World War, after stabilization had taken place, brought the use of controlled smoke out of obscurity, and it found its place in many other tactical situations.

Today, with the many means of producing it, it has become one of the agents which can promote tactical success; any commander of any type of combat unit who is unfamiliar with smoke and its uses on the battlefield is courting defeat and unnecessarily increasing casualties in combat, for the intelligent use of screening smoke offers innumerable advantages through concealment and deception.

It is unfortunately true that our own army has been slow in realizing the possibilities of this agent and neglectful of a study of this important subject.

On the battlefield of the future smoke will many times make the difference between success and failure, and between cheap and costly operations. An enemy must take heed of a smoke barrage because he cannot foretell what it means. It may be merely a target at which to expend uselessly his ammunition; it may foretell an attack; it may blind him in the execution of his own movements. In any event, it is bound to be detrimental both to his fire control and his morale.



Smoke is of particular interest to the Coast Artilleryman, since by the nature of things, the use of smoke by the Air Service lends itself particularly to the attack and defense of seacoasts. Smoke from naval shells may also prove an important factor. Had the attack on Gallipoli Peninsula been supported by well laid smoke screens, the result would probably have been different. Only a touch more was needed. With the guns and searchlights blinded, the mines might have been swept away and the Straits passed.

The experiments in England which had been conducted by the Admiralty, were sufficient to show the great value of such screens; but they appear never to have been actually used by the fleet at the Dardanelles. We find Mr. Churchill, in May of 1915, asking Vice-Admiral De Robeck about his smoke apparatus and telling him that there has been developed a means of producing white

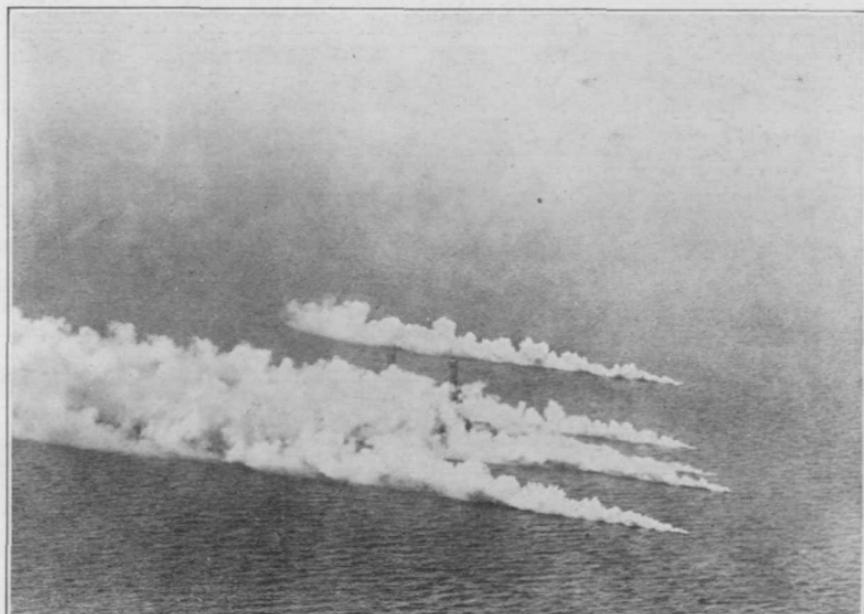
smoke by chemical action which is very dense and effective, and which can be fitted in a few hours to destroyers or torpedo boats.

Mr. Churchill says, "Surely a device of this kind would be invaluable for blanketing off the enemy's searchlights if at any time the night sweeping of the mine field was resumed."

Here is a thought that is worth considerable study.

Smoke was extensively and successfully used in the blocking attacks on Zeebrugge and Ostend. It will surely find a place in such ventures in the future.

Smoke is used generally in one of two ways: the enemy may either be blinded by a smoke cloud laid directly on him, or a cur-



cain or cloud may be erected between our own troops and the enemy's troops or vessels.

The smoke candle and the smoke shell are familiar to Coast Artillerymen; but a more recent development is worthy of very serious consideration. There has been produced by the Chemical Warfare Service in the last year a method for dropping a smoke curtain from an airplane in a truly marvelous fashion. This smoke curtain may find wider application in war than any other recent development in our army.

The apparatus used in equipping the plane to project such a curtain is simple and easily operated. It consists, essentially, of three tanks mounted in rear of the cock-pit of the plane, two of which contain the smoke mixture "F. M.", the Service name for titanium tetrachloride. In the third tank is carbon dioxide under

considerable pressure. The carbon dioxide is released into the F. M. tanks, and the F. M. is projected from a nozzle in the tail of the plane at a speed equal, or nearly equal, to the speed of the plane in still air.

The smoke curtain put down in this way combines great speed with high efficiency. The smoke material fumes, after striking the ground or water, so that there is little or no waste if the drops are not all turned to smoke in the air.

The screen can be hung as a curtain entirely suspended in the air, or it can be so placed as to reach the earth or water. It may be used to stop observation by fixed balloons, airplanes, elevated towers, or at night, against searchlights.



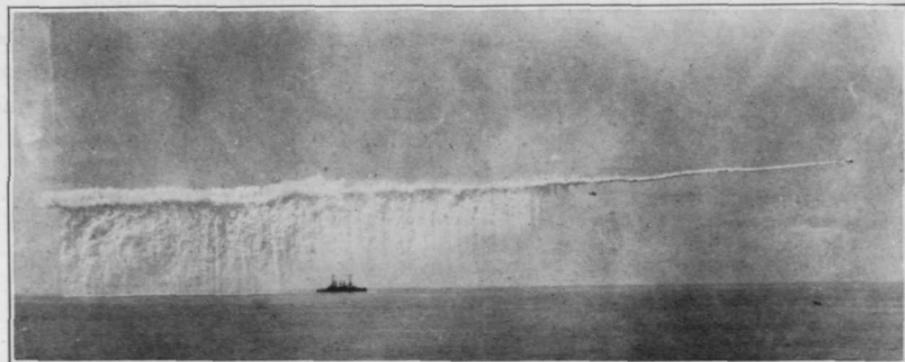
The curtain may be straight, curved or circular; may be long or low, short or high. Any combination of length or height that is desired can be obtained by using a number of planes.

If it is desirable to keep up the curtain for a long period, plane after plane can run over the same course, and as each one flies after the first, it can keep on the curtain side of the enemy, thus reducing the danger to the plane from antiaircraft gunfire.

The smoke curtain acts as its own tracer and the aviator driving the plane pulls it like a tail behind him where he wishes.

It is not intended to minimize the danger to the sprinkling plane from antiaircraft or our own air force; but it is certainly possible to block a portion of the antiaircraft defense by raining phosphorous bombs on coast defenses from high altitudes. Once the phosphorus has created its pall of smoke, the antiaircraft guns would be handicapped.

If the curtain cannot be placed directly in front of the defense and its observation points, there is little to prevent its erection directly on the flank of a fleet attempting to run-by or a similar maneuver.



A curtain more than a mile long and six hundred feet high can be laid by a fast plane in less than one minute. The size of the curtain can be readily increased by increasing the size of the F. M. tanks.

The value of such a screen could be easily tested at service target practice.



There is a more cheerful side that has to do with the uses of the smoke curtain in the attack of a fleet, or individual ships. Placed close to vessels by our own air men, it can be easily pierced by attacking planes which would be directly over the enemy ships before their antiaircraft guns would drive them to higher altitudes. Imagine such a curtain placed in front of a blockading squadron and emerging suddenly from it a dozen planes sent out from the

Coast Defenses with heavy bombs. The ship would be blinded until too late for the gunners' action.

As to the use of poisonous gases in this connection, it is only necessary to say that the worst of them (mustard gas) can be sprinkled as easily as can titanium tetrachloride; and mustard gas will not waste its time fuming in the upper air, either.

Even with this new development, the phosphorous bomb has not lost its interest for blinding battleships; and the pictures of the attack on the *Alabama*, even anchored as she was, will give some idea of what might be hoped for from such an attack.

Naval gunners must be able to see before they can shoot.

Millions of dollars have been expended to install the armament and accessories in our harbor defenses, all of which may have been wasted if an adequate personnel is not provided for its maintenance in proper condition for immediate use at the outbreak of war and for its proper operation when, and if, that time comes.

A recent study made by the War Department indicates that 19 coast defense commands in the Continental United States should be retained. Nine are now provided with only caretaking detachments varying from 7 to 35 enlisted men—a force adequate to prevent serious deterioration of the armament, but wholly inadequate to maintain the armament and accessories in condition for immediate use. The 10 remaining coast defense commands are provided with enlisted personnel varying from 124 to 500 men—sufficient to maintain properly the armament and accessories in condition for immediate use, but wholly inadequate to man the defenses at the outbreak of war, even when reinforced by the National Guard Coast Artillery units provided by the War Department Mobilization Plan.—*Annual Report Chief of Coast Artillery.* (SEE PAGE 486.)

The Coast Defenses of San Francisco

By SIDNEY BALLOU, LIEUTENANT-COMMANDER, U. S. N. R.

EDITOR'S NOTE: The following forceful, sound and convincing article is not only an appeal for better defenses for such cities as San Francisco, but also is a clear exposition of the missions of our harbor defenses. Its author is a recognized authority on military and naval policies.

Reprinted through courtesy of the Author and the San Francisco Chronicle.

IT is generally recognized that battleships in time become obsolete, through improvements in guns, armor and the many other essentials of a warship. It is not so generally understood, however, that the same thing must eventually happen to coast fortifications. Forts have an air of permanence that is deceptive. It is true that we look upon the old Civil War forts as relics of another age, but we are apt to think that anything built in our own day must endure.

Nevertheless, forts grow old. Obsolescence is much slower than with a battleship, but it is just as sure. Forts designed twenty-five years cannot reasonably be expected to meet modern conditions. Naval guns have increased in power and range; bombing airplanes have become a factor. There have been material changes both in what coast defenses are expected to defend themselves against, and in what they are expected to accomplish.

In some quarters the claim has been advanced not only that our coast fortifications are obsolescent, but that all fixed defenses are obsolete. This is based in part on a misconception of the real mission of coast defenses and in part on the over-enthusiasm of those who believe that airplanes are a substitute for almost every other kind of military weapon.

A port like San Francisco can be attacked by direct naval bombardment, by bombing aircraft, and by landing parties of troops. It is defended by fixed guns, by mobile guns, by antiaircraft guns, by mine fields, by combat planes as well as by bombing planes, by destroyers and by submarines. Larger types of naval vessels are not classed as coast defenses, because they should not be tied down to such work.

An enemy would approach San Francisco with one of two objects in view. Either he would be trying to inflict military damage, intending to retire before a superior force could be brought to bear, or he would be trying to establish himself permanently on the coast intending to resist any attempt to dislodge him. The first is a raid, the second is invasion. The coast defenses of San Francisco are

intended primarily to protect against damage from raids. They are not intended to stop invasion, except as they deny to the enemy the unloading facilities of a well equipped and protected harbor.

It is neither practicable nor desirable to defend every point of a long coast line against the possibility of the landing of an invading army. If the fixed defenses of our ports impose the tremendous handicap of landing men and supplies on open beaches, of getting artillery ashore where there are no wharves, they have more than justified their existence. Mobile guns can dispute such landings, land forces can be gathered while it is being accomplished, and the navy, no matter how far distant the time, can eventually put itself across the line of communications without which an invading army must perish.

With a raid it is different. In any war involving the Pacific, San Francisco automatically becomes a military base of the first order. Troops are encamped in its Presidio, fighting or auxiliary ships are in its harbor, its warehouses are filled with supplies, and it is maintaining all-important dockage, repair and supply equipment for the fleet.

A few hours' direct bombardment of such a base, at any time of the day or night, might do military damage which would seriously interrupt the prosecution of the war. The loss of non-combatant lives and extensive damage to private property, while quite incidental to the main purpose of the enemy, would be none the less serious to the citizens of San Francisco.

The Germans went even further in their ideas of the value of bombardment, believing not only that it was destructive to the enemy morale, as to which they were mistaken, but also that it kept a considerable force of the enemy on the defensive, as to which they were to a certain extent correct. The danger of raiding operations always produces a clamor for local defense which, when actual damage is done, it is hard to disregard.

From any standpoint, however, San Francisco is a legitimate object of bombardment in time of war. The question for the enemy to decide is whether the game is worth the candle, and the question for us to decide is whether we are willing to spend enough money to make it not worth the candle.

The candle in this case is battleships, battle cruisers or airplane carriers. Fortunately these are valuable vessels, limited in number. Before the Washington conference there were a great many obsolete battleships which would probably have been used for just this purpose, but these have all been scrapped. An important by-product of the conference, therefore, was a distinct lessening of the danger of coast bombardments.

First-class capital ships are extremely valuable. It is doubtful if any circumstances would warrant the risk of placing them within

the range of heavy coast fortifications. Whatever military damage could be done to San Francisco would be dearly bought at the loss of two of the first-line ships of the enemy.

An entirely different situation is presented, however, if we assume that a hostile fleet can bombard a port while lying outside the effective range of any coast fortifications. It is true that such a fleet is using up ammunition, fuel, and even the accuracy life of its guns. It is true that it has to deal with auxiliary defenses such as airplanes and submarines. No card player, however, objects to using his trumps if he is taking tricks, and a candid estimate of possible situations must recognize that many may exist in which an enemy would feel justified in taking such risks as remain if he does not have to reckon with direct hits from coast defense guns.

It is certainly unsafe to depend on aircraft defense alone. Airplanes have limitations of weather which do not bother dreadnaughts. Even if San Francisco is free from conditions of driving sleet or snow under which no airplane could leave the ground, one of our ever present fogs is a sufficient handicap on aircraft activity. Submarines count but little against fleets free to maneuver at full speed. The fixed gun, with sound ranging devices that even fogs cannot blind, is still the most dependable weapon—if it has the necessary range.

Now the plain truth is that the coast defenses of San Francisco have not the necessary range. The range of naval guns has increased enormously since the war. Instead of having a maximum elevation of 15 degrees, as was the standard in our navy, or of 20 degrees, as with the British, designers have found it possible to give an elevation of 30 degrees, and all the so-called *post-Jutland* ships, of our own and other navies, are so built. A modern 14-inch or 16-inch naval gun at this angle can throw a shell 32,000 to 34,000 yards, or from 18 to 19 miles.

The defenses of San Francisco, as well known, consist of Forts Baker and Barry north of the Golden Gate, and Forts Funston, Miley and Scott on the south. The backbone of their armament consists of 12-inch mortars of 1890 design, and 12-inch guns designed in 1888 and 1895, mounted on barbette or on disappearing carriages.

The mortars were installed from 1898 to 1903, which is a sufficient indication of their present usefulness. They throw a 700-pound shell about 15,000 yards. The barbette guns, on carriages of an 1892 type, were installed over the same period as the mortars and are not much better. The disappearing carriage of 1897 was the acme of pre-war development, and had its own special merits, but does not admit of elevations such as are now deemed necessary.

All this armament is still of use in preventing actual capture by direct naval attack, but is obviously outdated and outranged so

far as standing off a hostile fleet is concerned. It cannot even clear an area in which a fleet coming out of the Gate may get into proper battle formation.

The only guns with any claim to modern design are two 12-inch guns mounted just after the war. With their 27,000-yard range they could keep off all pre-war battleships and drive the more modern vessels to their extreme ranges, but in the last analysis they have not quite the reach of the latest naval guns. It is the case of a string not quite long enough.

There are in fact only two guns made that can be depended upon decisively to outrange the naval 16-inch gun on its 30-degree mounting. These are the 16-inch gun on a fixed coast defense carriage and the lately developed 14-inch railway mount.

The 16-inch gun, when used for direct fire, has a range of nearly 50,000 yards. If necessary it can be elevated to 65 degrees and fired with reduced charges to give the effect of mortar fire. This is the ideal gun for San Francisco, which has no railway along its beach. Two of them would be persuasive, four would be decisive. So far as the guns are concerned they can be had for the asking. The Navy has a surplus on hand.

This is another by-product of the Washington conference. We had ten new battleships and six battle cruisers planned and building, all to carry 16-inch guns. The naval gun factory was ahead of its program. The ships were scrapped, but the guns remain.

The Army has been offered as many of these guns as are necessary to equip every important harbor on both coasts. The cost of carriages and of completely equipped emplacements would be from \$500,000 to \$1,000,000 per gun. Considering the value of the property back of them, a few of these would be cheap insurance.

There remains only the possibility that aircraft carriers might lie out of range and attack with bombing airplanes. The best defense against this sort of thing is aircraft of our own. The number of aircraft carriers is limited by the Washington conference, and the number of bombers of effective size that can be carried on any one vessel is likewise limited. They are not going to swarm like locusts.

We have the beginnings of an antiaircraft defense, but only the beginnings. It is true that the Army has developed some wicked weapons, machine guns with tracer ammunition visible up to 10,000 feet, making possible accurate fire up to that point. Of the larger fixed types we have mounted a few 3-inch guns effective up to 21,000 feet, with a heavy bursting charge. The latest and best gun, a 4.7-inch, that can throw a 45-pound bursting shell higher than any bomber can climb is, like most of our good things, waiting for sufficient money to be manufactured and mounted in quantities.

The best defense against aircraft, however, is aircraft, and the chief enemy of the bombing plane is a single-seated combat plane

armed with a machine gun. This plane is twice as fast as the relatively unwieldy bomber. What is flying weather for the attack is flying weather for the defense. If the bomber has an escort of fighting planes more of the restricted space of its mother ship has been used, while there is no limitation on the number which may be assembled for the defense, if, in time of peace, they have been built.

Just at present, however, the defense of fighting airplanes for San Francisco is on a par with the 16-inch guns. There are none. Those that fly from Crissy Field are scouting or observation planes. Doubtless combat and bombing planes could be brought here in an emergency, but there would be many other cities crying for the meager supply. They are none too plentiful for the defense of a continent. Common prudence would seem to require a number on the ground trained to our weather and air conditions, but the Army cannot furnish what it has not the money to procure.

Summarizing the situation, the main objects of the coast defenses of San Francisco are to prevent actual capture of an important port, to prevent destructive bombardment of things of military value, and to provide a debouching area for an issuing fleet. With a wealth of medium range guns and mortars we have enough to prevent actual capture. We have barely enough to give material assistance to a fleet going out of the Golden Gate. We have not the long range guns nor the auxiliary equipment necessary to prevent bombardment.



EDITORIALS

REPORT OF THE CHIEF OF COAST ARTILLERY

THE Annual Report of the Chief of Coast Artillery is published elsewhere in this issue of the JOURNAL. It justifies careful study by every Coast Artillery officer—not only that he may keep abreast of present-day Coast Artillery requirements and progress, but also that he may be qualified, *on every proper occasion*, to assist the Corps by presenting its case when questioned by legislators or others interested in the defense of this country. Its outstanding feature is the vivid portrayal of the Coast Artillery's present lack of enlisted personnel, a condition which, in the words of the Chief of Coast Artillery "leaves many of our fortified harbors practically without any protection whatever, and none of them—even the most important—with anything like an adequate protection in an emergency." Concerning this condition the Report shows that the enlisted strength allotted the Corps during the past year was only 12,026, the same as during the previous year—the authorized strength of the Corps during these two years being less than at any time since 1901, although that of the Army is greater than at any time during that period except during and immediately after the World War.

The legal authorized strength of the Coast Artillery Corps of the Regular Army during 1915 was 701 officers and 19,019 enlisted men. It was increased by the National Defense Act, June 3, 1916, to 1201 officers and 30,000 enlisted men. The Army Appropriation Act of 1921 reduced the size of the Army from 280,000 enlisted men to 150,000, and that of 1922 further reduced it to 125,000 men. Due to these reductions in the size of the Army, the Coast Artillery Corps was reduced from 30,000 men to 12,026 men. Concerning this reduction the Report states: "At the time when these reductions were made in the enlisted strength of the Coast Artillery Corps, knowing how seriously the plans of the War Department were disrupted by the reductions made by Congress in the Army, I accepted the reductions made in the Coast Artillery Corps without offering serious objections and

have confined myself to setting forth on proper occasions the conditions which have resulted therefrom. I feel it to be my duty now, however, to bring this matter clearly to the attention of the Secretary of War, and to recommend as forcefully as possible that a serious effort be made to correct these conditions: first, by allocating to the Coast Artillery Corps so much of the additional personnel required as is possible from the present authorized strength of the Army; and second, in case the additional personnel which can be so allocated is insufficient to meet the requirements, then, by presenting the facts to Congress with request for such an increase in the authorized strength of the Army as may be necessary for the purpose."

In 1915 and 1916 Coast Artillery requirements were calculated on the assumption that the personnel from the regular Army should provide a complete manning body for the gun and mine defenses of the oversea fortifications and for one-half of the gun and all of the mine defenses of the home fortifications, the intention being that the other half of the gun defenses of the home fortifications should be manned by the Militia forces of the seaboard states. Since that time, however, the Organized Reserve has sprung into being, batteries have been abandoned, other batteries have been installed, and the Coast Artillery Corps has taken on new activities —antiaircraft, railway artillery and heavy tractor artillery. In consequence of this, it has become necessary to use another basis for calculating Coast Artillery personnel requirements.

Very naturally the War Department Mobilization Plan is used for this purpose. This Plan provides for the continental United States alone, during the first stages of mobilization, 274 harbor defense firing batteries, 19 antiaircraft regiments, six heavy tractor regiments and five regiments and one battalion of railway artillery, these units to be provided by the Coast Artillery of the Regular Army, National Guard and Organized Reserves. The Report assumes that these units, constituting as they do a part of our first line of land defense, should be ready for service almost immediately upon the outbreak of war; that National Guard Coast Artillery regiments can be expanded from peace to war strength without materially interfering with their ability to man the elements to which assigned; that a single regiment of Regular Coast Artillery Service at peace strength can be expanded to two regiments at war strength within a reasonable time; and that Organized Reserve antiaircraft and railway artillery regiments cannot possibly be ready for service within one month of the outbreak of war.

Using these as a basis, the Report recommends that the Coast Artillery Corps of the Regular Army within the continental limits of the United States be expanded to include six antiaircraft regiments each with a peace strength of 1,050 men; one brigade headquarters and four regiments of railway artillery, two with a peace strength of 829 men and two with a peace strength of 415 men; and three regiments of heavy tractor artillery, one with a peace strength of 1,076 men, and two with a peace strength of 538 men. It further recommends that the Coast Artillery garrison in Panama be increased from 1,800 to 2,980 men; that of the Hawaiian Department from 3,000 to 3,992 men; and that the garrison of the Coast Defenses of Manila and Subic Bays from 1200 to 3600 enlisted men, this expansion being made by replacing with American troops, the Philippine Scouts now used for this duty. The Chief of Coast Artillery in this Report recommends total additional forces for the Coast Artillery Corps of the Regular Army of 19,557 enlisted men and 677 commissioned officers.

The Report further recommends: that the present policy of sending officers to foreign service in time of peace without consideration to their own convenience be amended so as to permit exceptions to a limited extent; that the number of officers now authorized to attend the Battery Officers Course at the Coast Artillery School be increased; that at least two R. O. T. C. units be established in the 2nd Corps Area; that every proper effort be made to provide the money necessary for the immediate completion of the project for installing 16-inch guns in our harbor defenses; that permanent fire control systems be supplied as rapidly as possible for new harbor defense installations; that funds be appropriated for transferring one 14-inch railway gun to the Pacific Coast for service test; that further provision be made for the manufacture of 14-inch railway mounts; and that appropriation of funds be secured for intensive development of antiaircraft materiel and fire control apparatus.

It contains among others, the following interesting statements: that the military policy of this country is now, as it always has been, based upon considerations concerning the defense of the United States and its territorial possessions against attack and is in no wise aggressive; that the first consideration in providing military forces in this country should be the vital necessity for protecting the continental limits of the United States and our foreign possessions against attack by any first class power or by any reasonable combination of such powers; that 19 coast defenses in the continental United States should be retained; that the War Depart-

ment Mobilization Plan, 1924 assumes that M-Day and D-Day may be coincident; that to assume that reinforcements can be sent to the Hawaiian Department after the outbreak of war is a dangerous policy; that the strengths now allotted to the various activities of the Coast Artillery Corps and the strengths which should be allotted to each if we expect to insure a reasonable efficiency in time of need, are as shown in recapitulation on page 492, that the training of Coast Artillery troops in the continental United States has been handicapped by the limited personnel available; that it is expected the entire Coast Artillery series of Training Regulations will be practically completed during the fiscal year 1925; that approximately 600 members of the Officers' and Enlisted Reserve Corps attended the 1924 summer training camps; that during the academic year 1923-24, Coast Artillery units of the R. O. T. C. have been conducted in 18 institutions; that approximately 450 R. O. T. C. students attended the 1924 summer training camps; that the reorganization of the Coast Artillery Corps into regiments will have a far-reaching effect upon the efficiency of the Corps, including National Guard and Reserve units; that only one 14-inch railway carriage suitable for firing at moving targets has been completed, this carriage having been tested by the Ordnance Department and accepted as satisfactory; that the .50-caliber anti-aircraft machine gun has passed the preliminary test, and fifteen of them with tripod mounts completed; that the 3-inch antiaircraft gun on fixed mount, Model 1917, M. I. has been approved for production; that the development of the 4.7-inch antiaircraft gun has not progressed satisfactorily during the past year due to difficulties in design that have been encountered; that our antiaircraft artillery is without any efficient apparatus for the location of aircraft at night by sound; and that the number of searchlights now available for illumination of air targets at night is insufficient and it is thought inadequate to meet the requirements of mobilization.

THE DARDANELLES CAMPAIGN

THE JOURNAL is fortunate to be able to present to its readers an analysis and discussion of the salient points of the Dardanelles Campaign of 1915. This study was prepared by Major Sherman Miles, General Staff. Major Miles is eminently fitted to prepare such a study, being a graduate of the Army War College and having spent a number of years as Military Attaché at various of the Balkan Capitals. During the past two years he has been on duty at Constantinople during which time he has made numerous visits to

the Dardanelles battlefields, with both Turkish and British officers, and has had free access to the files of the Turkish General Staff.

By many the Dardanelles campaign is considered the most interesting of the War. This because it was amphibious in its nature and because an advanced military power attacked a power not so advanced in the science of war and lost, largely because of the hap-hazard way it went about it. A study of this campaign should prove of especial interest to all Coast Artillery officers, involving as it does attacks by the navy against land fortifications and landings on hostile shores. The value of this study is enhanced because it has been reviewed by General Sir Ian Hamilton and his comments presented as footnotes thereto. Anyone reading Major Miles' study will be impressed anew with the enormous difficulty of effecting a landing on a hostile shore when faced by a determined enemy. There are no fixed headquarters, and communications break down. Everything depends upon the smaller units. Men over-loaded with ammunition, food and water and probably drenched, become exhausted quickly after reaching the shore. It is surprising that landing attacks on open beaches ever do succeed. They never could provide troops on shore were properly organized to meet the attack. No one can read this part of the article without calling to mind our own positive system of coast defense and appreciating the soundness upon which it is based. Moreover, the reader is very apt to conclude that any hostile force attempting a landing in this country will undertake to reduce our harbor defenses so as to insure suitable anchorage for the fleet and suitable facilities for quick debarkation, rather than make the effort on the open coast.

Major Miles writes as follows: "My notes are the first purely military critique yet written on that campaign (the Dardanelles Campaign of 1915,) which has more lessons to teach than any other of the World War. I am sorry they are so long, but to get a properly balanced critique of a campaign, certain space is necessary."

Major Miles' Notes will appear in this and succeeding numbers of the Journal.

PROFESSIONAL NOTES

Notes on the British Army

By MAJOR J. H. CUNNINGHAM, C. A. C.

The following notes on the Brit'sh Army have been amplified from those used in the preparation of a twenty-five minute talk delivered during the last Field Officers' Course at the Coast Artillery School.

Great Britain's defense forces are divided into three branches—the Army, Navy, and Air Force, each under the control of a separate ministry. The question of combining the three under a single department of National Defense, as has been done in Canada, Australia, New Zealand, and South Africa, is under consideration. The Navy and the Air Force form Great Britain's first line of defense, and her greatest military weakness today is her inferiority to France in aviation, as shown in the following chart.

PLATE I

COMPARISON OF FRENCH AND BRITISH AIR FORCES (JULY 1923)

	Great Britain	France
Active Air Squadrons in Europe	23	105
Total Squadrons.....	40	140
Average machines per squadron.....	12	9
Total active machines	480	1260

To meet this situation, a program was undertaken in 1923 to increase the Air Force by 34 squadrons. Although the development of aviation has on the whole weakened Great Britain's strategic position, especially as regards France, it has strengthened it in some respects, as through its use she is now able to preserve order in her outlying possessions and in other areas vital to her security with a considerable saving of money and man power. The Air Force, assisted by small army contingents, is in full and exclusive control of the defense of Irak and Palestine and is being used extensively in Transjordania and along the northwest frontier of India.

The Army is the second line of defense; the bulk of the regular forces at home, except those in Ulster, are organized into a so called Expeditionary Force, and are kept fully trained and equipped for overseas duty. In the fall of 1922, at the time of the Dardanelles crisis, about 12,000 troops were shipped from England and Ireland in a few days. Together with units brought from Gibraltar, Malta, and Egypt, a force of 19,500 men was assembled at Chanak and on the Gallipoli Peninsula in about two weeks.

Plate II, below, shows in condensed form, the strength and composition of the British, Dominion, and Colonial forces and of the Indian Army.

PLATE II

BRITISH, COLONIAL, AND DOMINION FORCES

British Army.....	Regular Army.....	153,000	Colonial Indian.... 10,000
	Reserves—Officers	8,000	
	Other ranks.....	70,000	
	Militia.....	2,000	
Indian Army.....	Territorials.....	150,000	
Colonial troops	Regular Army.....	310,000	British Troops 77,000
	Reserves.....	75,000	
Canadian Defense Forces	Under Foreign Office	8,700	
	Permanent Force	3,350	
Australian Defense Forces	Militia.....	60,000	
	Permanent Force	3,200	
New Zealand Defense Forces	Militia.....	30,000	
	Permanent Force	500	
South African Defense Forces	Militia.....	15,000	
	Permanent Force	2,000	
	Militia.....	7,000	

The strength of the British Army is about 165,000 officers and men. This includes:

a. The British Regular Army, except units serving in India and Aden. The latter are part of the Indian Army, while so serving.
 b. 2000 Colonial troops paid by the War Office; these consist of a few units only, such as the West Indian regiment, in Jamaica, and the Hong Kong-Singapore Garrison Artillery. The 8700 Colonial troops given further down in the table are under the Foreign Office and consist of native troops with white officers, stationed in the various British dependencies in Africa (Nigeria, Kenya Colony, Somaliland, etc.).

c. 10,000 Indian troops serving in China, Singapore, Irak and Palestine.

The Regular Army, upon mobilization, will be brought to war strength by calling up reserve officers and the Army Reserves (enlisted men) and by embodying the Militia, which consists of a small technical personnel only (no units).

The Territorial Army is not supposed to leave England without the passage of a special act of Parliament; it is organized approximately as follows:

14 infantry divisions	125,000
2 cavalry brigades	3,000
Army troops	16,000
Coast defense troops	6,000

The Indian Army consists of native troops with white and native officers, the former being in the majority, especially in the higher grades. The general officers and most of the staff officers belong to the British Regular Army.

The lower four rectangles of Plate II show the strength and composition of

PLATE III
BRITISH MINISTRY OF WAR

Army Council	Sec. of State for War.
	Under Sec. of State for War.
	Chief of the Imperial General Staff (Training-Operations-Intelligence)
	Quartermaster General (Supply-Equipment).
	Adjutant General (Personnel).
	Master General of the Ordnance (Manufacture and design of ordnance).
	Judge Advocate General.
	Surgeon General.
	2 civilian members (financial matters).

Aldershot	Northern	Southern	Eastern	Western	Scottish	N. Ireland	London	District
Command	Command	Command	Command	Command	Command	Command	District	District

General Staff with Troops

G-Branch	A-Branch	Q-Branch
Training Operations Intelligence	Personnel	Supply

the Dominion forces, which except for a few British officers and non-commissioned officers loaned as instructors have no connection with the British Army. Military training in the British dominions is at a low ebb.

As stated above, the strength of the British Regular Army, excluding troops in India, is about 165,000; of these, over 100,000 are in Great Britain, largely concentrated in the Aldershot and Salisbury Plain areas. There is a garrison of several thousand in Ulster, but all British troops, except a few coast defense units, have been evacuated from the Irish Free State.

The British forces overseas are believed to be between 40,000—50,000, half of whom are stationed in the Mediterranean and the Near East.

British military policy in the Near East is based on three fundamental principles:—

- a. The line of communications to India must be protected.
- b. Vital economic resources (oil) must be retained.
- c. The advance of Russia to the south towards India must be arrested.

The line of communications to India is protected by garrisons at Gibralter, Malta, Cyprus, in Egypt and at Aden. The forces in Irak are for the protection of the Mosul oil fields as well as to guard against a Turkish or a Russian-Turkish advance to the southwest. The garrison in Palestine is for the defense of the eastern borders of that state against Arabian tribes from the desert. India itself is protected by the Indian Army, which includes, as stated above, 77,000 British troops.

There are between 5000—10,000 British troops on the Rhine, and the remainder of the overseas forces, approximately 10,000, are scattered in small garrisons in China, Singapore, West Africa, Bermuda and Jamaica. The latter garrison consists of a battalion of British infantry and the West India regiment, the latter colored and of little combat value (were used as labor troops during the world war)

Passing from the general military policy of Great Britain and the missions assigned to the Regular Army, as shown by its distribution at home and overseas, a few of the most important features of *organization* will be discussed.

Plate III gives the composition of the Army Council, which controls the Army, shows the division of Great Britain into territorial commands and indicates the three main divisions of the general staff with troops.

There is an important difference between the British staff system and our own, in that, with the British, there is no Chief of Staff, as we understand the term. The Chief of the Imperial General Staff, for example, has charge of operations, training and military intelligence, but has little or no control over the Quartermaster General, who handles questions of supply, or over the Adjutant General, who handles questions of personnel. The same applies in the case of the general staff with troops, although in a small command the staff officer in charge of the G-branch is usually the senior staff officer and does exercise some coordinating power over the Q and A branches.

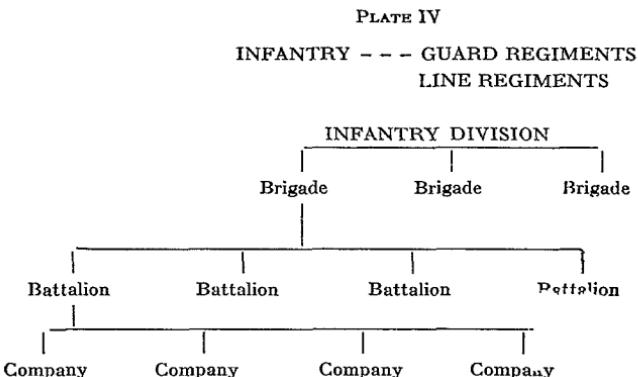
The bulk of the regular forces at home are organized into two cavalry brigades and five infantry divisions. These units are for the most part concentrated in the Aldershot and Salisbury Plain areas, southwest of London, and form the so-called Expeditionary Force. The infantry divisions at peace strength each consist of:

- 3 infantry brigades (4 battalions each).
- 3 field artillery brigades (4 batteries each).
- Auxiliary troops (engineer and signal).

The war strength of an infantry division is probably between 18,000—19,000, and it consists of approximately the following:

- Division Hq. and Hq. Co.
- 3 Signal companies
- 1 Divisional employment company
- 1 Ordnance company
- 1 Provost and traffic company
- 3 Infantry brigades (4 battalions each)
- 3 Field artillery brigades (4 batteries each)
- 1 Divisional ammunition column
- 4 Engineer field companies
- 1 Field ambulance
- 1 Mobile veterinary section

The *infantry peace organization* is shown below in Plate IV.



It should be remembered that the infantry regiment is purely an administrative and sentimental unit, consisting of a varying number of battalions, all of which wear the same uniform. The tactical unit is the battalion. There are at present 10 battalions of foot guards and 126 battalions of the line (including troops in India) each battalion consisting of about 750 officers and men. The foot guards are picked troops and ordinarily do not serve overseas.

PLATE V
ORGANIZATION OF BRITISH ARTILLERY

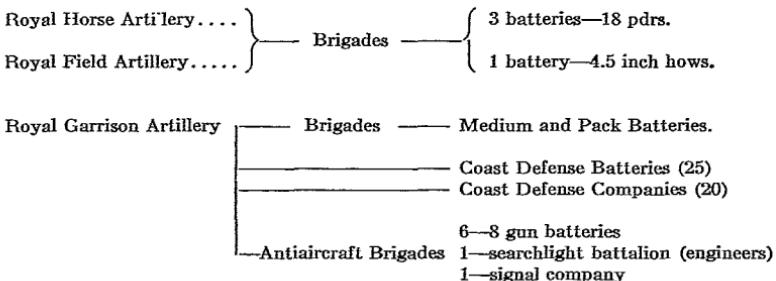


Plate V shows the organization of the *artillery*. As with the infantry, regiments are purely administrative and sentimental units. At present there are 15 batteries of horse artillery, 112 batteries of field artillery, 44 medium and pack batteries, 45 coast defense batteries and companies and at least one antiaircraft brigade. The only difference between coast defense batteries and companies is that the former serve at home and the latter overseas.

The cavalry is organized into squadrons and regiments. Unlike the infantry and artillery, the cavalry regiment is a tactical unit and consists of a little less than 600 officers and men. There are at present 2 household regiments and 20 line regiments.

The *engineers* are divided into searchlight, fortress and field companies; the two former serve in the coast defenses or as part of antiaircraft brigades and the latter form part of infantry divisions.

There is a separate Tank Corps, with tank companies and battalions and

Armored car companies; many of the latter are being used in Irak, Palestine, India, and Egypt. The Machine Gun Corps has been abolished as a separate branch.

During 1921-22 there was a considerable reduction in the infantry, artillery and cavalry. Press accounts state that this year's estimates call for no appreciable change in the authorized strength of the Army, whose units are believed to be in a very satisfactory state of efficiency. Withdrawal of troops from Ireland and Constantinople during 1923 permitted the reorganization of the divisions of the Expeditionary Force and last summer each of these divisions carried out divisional maneuvers lasting two weeks. It must be remembered that Great Britain constantly maintains considerable forces on a war footing or actually engaged in minor warfare, in Ulster, Egypt, Irak, Palestine, India, and on the Rhine, where in many cases actual use is being made of all weapons of modern warfare. In the fall of 1923 there were several thousand British troops massed along the Ulster-Irish Free State border to prevent a clash between North and South Ireland; martial law was in effect in parts of Egypt; 20,000 British troops at the Dardanelles were holding back the Turkish Nationalist Army from crossing into Europe; a large British-Indian force was in the Mosul Area in Northern Irak with considerable probability of a joint Russian-Turkish attack; guerilla warfare was going on along the eastern border of Palestine; and the usual border warfare was taking place along the northwest frontier of India. The British Dardanelles expedition has since been withdrawn, and conditions in the other theaters of operations are much improved; there is always fighting, more or less severe, along the Indian northwest frontier, against the border tribesmen.

The Territorial Forces probably may be compared in efficiency to our National Guard; during the summer of 1922, 111,000 officers and men, out of a total of 150,000, received two weeks field training. So far as known, no organized training is given to reserves, either officers or enlisted men.

The most important British military schools are:

- a. Woolwich and Sandhurst, corresponding to West Point and training cadets, at the former for the Artillery and Engineers and at the latter for the Infantry and Cavalry.
- b. Staff College—Camberley.
- c. Senior Officers' School—Woking.
- d. Small Arms School—Hythe.
- e. Machine Gun School—Seaford.
- f. School of Equitation—Weedon.
- g. Artillery School—Larkhill.
- h. Coast Artillery School—Shoeburyness.
- i. School of Antiaircraft Defense—Salisbury Plain.
- j. School of Military Engineering—Chatham.
- k. School of Signals—Uckfield.
- l. Tank Corps Central Schools—Bovington.
- m. School of Military Administration—Chiseldon.
- n. Royal Army Medical College—London.

The Royal Air Force has a complete school system of its own, including a staff college, a cadet college and various training and flying schools. At Salisbury is the Royal Air Force School of Army Co-operation, which works with the Artillery School at Larkhill in training Army and Air Force officers in all forms of co-operation.

The Diaphragm Gas Mask

THE DIAPHRAGM GAS MASK

It has been realized for some time that the ordinary type of issue gas mask is not suited for use by Coast Artillery personnel obliged to use optical instruments or to carry on extended and important telephone conversation in the course of drill or action. The Chemical Warfare Service has accordingly developed two types of masks especially fitted for work of this kind.—These masks were recently given a practical test by Battery A, 6th Coast Artillery, stationed at Fort Winfield Scott, California. Following are extracts from reports of this test by the two officers most directly concerned, Major O. A. Eastwold, Chemical Warfare Officer, Ninth Corps Area, and Captain H. L. Whittaker, C. A. C., Commanding Officer of the battery conducting the test.

MAJOR EASTWOLD'S REPORT

Object of the Test: In conducting this experimental work it was desired to secure information on the following questions regarding the gas mask:

- a. Are the present gas masks, with the diaphragm, entirely suitable for the fire control section of a Coast Artillery battery?
 - b. If the gas masks are not suitable, what changes are recommended?
 - c. Are the duties of any of the men in the fire control section such that he could not wear the gas mask?
 - d. Is the rate and accuracy of the firing of a battery materially reduced by having the personnel wearing the latest type of gas mask?
- From the foregoing, it is to be noted that the experiment dealt primarily with the fire control section, however, the question under (d) also included the gun section.

Organization: The experiment was conducted by Battery "A," Sixth Coast Artillery, commanded by Captain H. L. Whittaker, C. A. C. with 1st Lt. H. A. Burnell, C. A. C. as range officer. This organization was assigned to a 6-inch battery, barbette carriage. When this work was started the battery commander stated that his organization had experienced men in the following positions only, namely, gun commander, gun pointer, range setter, plotter, observer B' (D. P. F.) The balance of the personnel in the battery consisted of men with about six weeks service and who had had no prior experience with a coast artillery battery.

Equipment: The gun pointer and observer were equipped with the diaphragm gas mask made for use with *optical instruments*. The observer used this mask throughout the experiment, but the gun pointer had his mask replaced with a standard diaphragm mask, type 3-3-2, as the former mask was not comfortable for continuous work. All of the men in the plotting room, telephone operators and such other men who had to use their voice in giving commands, etc., were equipped with the standard diaphragm mask. The balance of the men in the battery used the A. T. mask.

Instruction: The experiment was started on August 25th and completed on September 17th, and was worked in with the regular artillery drill for the battery. During this period there were only five days in which an actual target was plotted and a real drill could be conducted. This was due to the persistently heavy fog in San Francisco. During these days a total of three hours and five minutes of artillery drill, in periods of from 10 to 30 minutes, was conducted with the wearing of the mask. On the other days, hypothetical courses were plotted and drill in talking and working in the masks was given. On September 10th a sub-caliber drill with target for 40 minutes, continuous, was conducted with masks worn during the last 5 minutes. Only six rounds were fired on this day due to extremely hazy weather conditions. An exhibition drill and subcaliber firing with masks were conducted on September 13th for the R. O. T. C. Students of the University of California. The drill with

masks lasted 20 minutes in which time ten rounds were fired and seven hits obtained. No gas was released during this exhibition.

Test: The final test with the gas masks was made on September 17th with the battery taking station equipped with gas masks as mentioned in Par. 4 above, and conducting sub-caliber practice using only *one* gun. The target was started on its course and assigned by the Battery Commander. A few rounds were fired for adjustment, which was followed by ten rounds, fired for effect. "Tear gas" was then released over the entire battery, including the plotting room, and the alarm "*GAS*" given. Masks were adjusted and fire immediately reopened with all personnel wearing the masks, including men in the observing station and the spotter in the fire commander station. 22 rounds were fired in this phase.



The time for firing the first ten rounds without the masks was 2 minutes and 50 seconds. The time for firing the first ten rounds with the men wearing gas masks was 2 minutes and 55 seconds. The remaining 12 rounds were fired in small bursts due to the hazy conditions around the target from that point on. The last 5 rounds were fired for speed in one burst and the time was one minute and 15 seconds. For this experiment it is believed that the question of the number of hits is not the most important factor, but the main issue is the accuracy and smoothness of data transmitted to the gun. In this experiment it should be noted that by far the largest percentage of the enlisted personnel of the battery had just passed through the recruit stage of instruction and, for that reason, the test was very valuable as it showed that the men with a reasonable amount of gas mask instruction quickly acquired confidence in the efficiency of the latest type of gas mask, and, having acquired this confidence, "carried on" as well in the presence of gas as before the gas was released.

Conclusions: If the foregoing experiment could have been concluded with a target practice using service ammunition, a more thorough test could have been accomplished, but it is believed that the following conclusions, which were drawn from the subcaliber target practice, are sound and reliable:

It can be stated that the present standard gas mask, type 3-3-2, is entirely suitable for the men in the fire control section of a coast artillery battery, except for such men who have to use optical instruments. Although the gun pointer used the standard diaphragm mask and obtained very satisfactory results, he would be able to remove the parallax, focus his instrument, and follow the target with less effort if he could have worn the mask made for use with optical instruments. The observer used this latter type of mask even though it was somewhat uncomfortable and obtained very good results.

Of the three different types of masks used, the only one considered not entirely suitable was the mask for use with optical instruments. This mask was found uncomfortable, due to the breathing tube pressing against the cheek bones and the sharp edge of the diaphragm bearing on the chin. The latter discomfort was partially eliminated by placing a small roll of waste in front of the chin. It is believed that the first discomfort can be eliminated by using the rubber butterfly tube, and the second by placing a rubber pad over the lower edge of the diaphragm to protect the chin. The principle of having the surface of the eyepieces practically in the same plane should be maintained, but the bar connecting the two eyepieces is not considered necessary. This mask should be a standard mask for use with all standard type of optical instruments in the service, including self-contained base range finders.

As mentioned above, every member of the fire control section was equipped with a gas mask. Each one performed his duties practically as efficiently when wearing his mask as when not wearing it. The plotter, who has the most difficult duty to perform in the plotting room, stated that the wearing of the mask was not much of an impediment in plotting, and the accuracy and speed of his work verified his statement. From this it may be stated that it is not necessary to have the observing stations and plotting rooms made gas proof. There should, however, be constructed gas proof shelters in, or near, a battery where the men may go to rest and remove their masks, as it was noticed that the gas remained a long time in the plotting room and all other compartments of the battery after it was released. The tear gas was projected over the battery by candles, set off on the windward flank, the gas cloud rolling into the battery as if it were a pocket.

In comparing the number of hits and the time for firing the ten rounds from one gun, and the smoothness and accuracy of the transmission of data when the entire personnel in the battery were wearing the masks, and when they were firing without the masks, it can be stated that for short bursts of fire the wearing of the masks does not materially affect the rate and accuracy of the firing of a battery. Over long periods of firing the range section would not suffer much additional fatigue from the wearing of the masks, but the gun crew would be affected as their duties are more strenuous.

Remarks: In this experiment, the greatest difficulty was the training of the men to pronounce every syllable of a word, and to speak slowly and in a moderate tone over the telephone. This difficulty is always experienced in the training of recruits but more stress must be placed on it when wearing the mask. Hence, due to the fact that a Coast Artillery Battery is fixed and its fire control equipment cannot be readily removed, thorough gas mask instruction is of vital importance to Coast Artillery troops, not only in the proper care, firing

and adjustment of the mask, speed in putting it on and knowing when it should be worn, but, also, to have all telephone operators, and such other men who have to use their voice in the performance of their respective duties, so trained that they can "carry on" as efficiently when wearing masks as when not wearing them. It is believed that thorough instruction can practically accomplish this, that this instruction can be worked in during regular artillery drill periods, and thereby not take up much additional time. To properly conduct this training, it is recommended that each Coast Defense be supplied with a sufficient number of diaphragm masks, in addition to such masks as are now furnished, to entirely equip the fire control section of a battery and such other men who have to use their voice in the performance of their duties. This set of diaphragm masks could be pooled in the Coast Defense and used by the various batteries, in turn, during the training season.

The Coast Defense Commander, Colonel P. P. Bishop, and all officers of the battery were greatly interested in the experiment and co-operated in every respect in making a thorough test of the various types of gas masks used.



CAPTAIN WHITTAKER'S REPORT

The Chemical Warfare Service has recently developed two types of mask especially fitted for Coast Artillery personnel required to use optical instruments and to carry on extended telephone conversations. The first is similar in construction to the ordinary mask with the addition of a diaphragm perhaps three-inches in diameter in front of the mouth. The details of the diaphragm are the secrets of the Chemical Warfare Service. The second mask is like the ordinary mask in shape and material but has added to it special eyepieces for use with optical instruments and is also supplied with the diaphragm.

About the first of August this year, Major O. A. Eastwold, in charge of the Chemical Warfare Service of the Ninth Corps Area decided to hold a series of tests of these masks under service conditions as nearly as could be simulated. Battery A, 6th Coast Artillery, was designated to conduct the test. This battery had shortly before been filled up with recruits, and in this resembled more or less a newly organized battery at the outbreak of hostilities. The battery is in the Mine Command and is assigned to Battery *Chamberlain*, a 6-inch bar-

bette battery. Below is set forth the pertinent information as to the methods used and the results obtained.

When the final test was given the battery on the morning of September 17th, the battery took station equipped with diaphragm masks except the recorders and numbered cannoneers, who had the ordinary masks without the diaphragm. The observer was equipped with the mask having the special eye pieces and diaphragm. The gun pointer wore the diaphragm mask with the ordinary eye pieces, as he had previously found that this type was more comfortable and suitable for his work.

The target was started on its course and assigned by the battery commander. Fire was adjusted in two rounds and twelve rounds were fired for effect. Gas was then released on the battery and the warning "gas" given. Masks were adjusted and fire reopened with all personnel protected including the observer and the reader at B'. Twenty-two rounds were fired in this phase.

The time of firing the ten rounds without the mask was two minutes and fifty seconds. The time for the first ten rounds after masks were adjusted was two minutes and fifty-five seconds. The remaining twelve rounds were fired in bursts of two or three because of the haze which the target ran into at that point. The last five rounds were fired for speed in one burst and the time was one minute and fifteen seconds.

After the command "gas" was given it was necessary to execute the following movements before fire could be resumed: Headsets removed, masks put on and adjusted, observer and gun pointer had to get on the target again, data had to come down from B', pass through the plotting room and out to the gun, and this data set on the gun, and the gun itself loaded and fired. The time for this complete cycle was exactly one minute. It is believed that this time can be cut down materially as the time lost was in the mechanical handling of the gun, and in any case full protection was sought rather than pure speed. The important feature in the opinion of the undersigned was that the data was interrupted only for one ten second bell and that its accuracy was unimpaired. As a matter of fact the first shot after re-opening fire was a hit, which was due to considerable extent to the fact that the flow of data and its accuracy was kept up at normal, although it must be admitted that whatever kind fate watches over probabilities must have been in good humor at the moment.

Twenty-two rounds were fired after the command "gas" was given with a total elapsed time of eleven minutes. This time includes delays for three misfires of primers totalling 45 seconds and 4 minutes and 20 seconds due to hazy conditions around the target and chargeable to safety precautions. These delays would have been exactly the same without masks. This gives a time of 5 minutes and 55 seconds for the 22 rounds which rate is satisfactory. The gun section therefore suffered no apparent difficulty or decrease of efficiency from the use of the masks.

In the plotting room after the command "gas" was given a new correct range was sent out to the gun in ten seconds, a loss of one bell. Ranges were sent out regularly every ten seconds and the range from the plotting board reached the Pratt Range Board fifteen seconds after each bell, a time equal in every respect to that of the section operating without masks. No time was lost due to repetition and data was sent on every bell, the center of impact being kept on the target meanwhile by adjustments. All corrections and adjustments were worked out in the plotting room as the practice proceeded. It

is thus apparent that the range section suffered no decrease in efficiency from wearing the masks.

Analysis of the data recorded, and the plots etc., show that the accuracy, reliability and smoothness of operation were in no way affected by wearing the masks. There were three 10-yard errors found which was probably due to play in the instruments. This sort of error is to be normally expected except with a highly trained personnel.

In the 10 rounds fired immediately before the gas was released, 5 hits were reported by the spotter. The deviations in range for the other 5 shots averaged 15 yards, some over and some short. After gas was released, 4 hits were reported in the first 10 shots, the range deviations being about 15 yards for the other six as before. This shows that the battery functioned as well in as out of the masks, as the center of impact was kept on the target at all times, and it might have happened readily enough that the hit results were



five in the mask and four out as vice versa. Two more hits were reported in the remaining twelve shots. The visibility was very poor for these last, as the target ran into a bank of haze which made observation from B', which is high up on a hill, rather sketchy and probably made the data a trifle erratic. The range deviations for these 12 shots averaged only twenty yards, which seems fair enough under the conditions. The lateral deviations were negligible. The number of hits is not necessarily the criterion, as it is believed that the accuracy and smoothness of the data transmitted is the proof of interference or non-interference of the mask. It should be remembered throughout that the battery training was rather fragmentary. For that reason, the test was probably more valuable as it showed that an average personnel with little training would not go to pieces even with actual gas on them.

The observer reported that the mask with the special eye pieces was satisfactory for observing, but was very uncomfortable to wear owing to the construction of the eyepieces and the inlet tubes. These tubes rub on the cheeks and irritate the skin considerably. The gun pointer could not wear the mask with the special eyepieces as the tubes cut the skin when firing the gun. He reported that the ordinary diaphragm mask felt very comfortable and he could evidently see well, as the lateral deviations show.

In view of the above results the following conclusions may be drawn:

That the gas mask with the diaphragm as used by this battery is entirely suitable for the fire control section of a Coast Artillery Battery.

That the duties of none of the men in the battery are such that he cannot wear the mask.

That the rate and accuracy of a battery firing in gas masks is not affected by their use.

That the mask with the special eyepiece is unsatisfactory at present owing to the uncomfortable tubes. This would, it is believed, effect a reduction of efficiency in the long run, as the man wearing it would become more and more conscious of the rubbing if he wore it any length of time, and in the end would have part of his mind on how badly he felt and the other part only on his work.

For a matter of comment only the following thought has come to light in the test: It was noticed that after the test was over all telephone operators used their instruments more efficiently. This was due, it is believed, to the fact that enunciation with the masks on had to be very slow and clear, stressing every syllable practically as much as every other. If this is not done the words tend to become distorted and the message garbled. The habit of care which they acquired in training with the mask made them much better operators outside the masks. It also seemed to the undersigned that there was less than the ordinary confusion of voices in the plotting room with the masks on, as the voices were somewhat muffled and did not echo, and each man listened more concentratedly to the man from whom he was receiving his data. As a matter of personal opinion only, the undersigned believes that all Coast Artillery Batteries should receive regular artillery training in masks, and that sub-caliber at any rate and probably some service practice should be held in masks.

Defense for the Petroleum Industry

By COLONEL GEORGE RUHLEN, U. S. ARMY

The COAST ARTILLERY JOURNAL of August, 1924, published at Fort Monroe, Virginia, contains a very interesting and instructive article under the heading "The Petroleum Industry and its Influence on the Role of the Coast Artillery," written by Lieutenant-Colonel James Prentice, U. S. Army.

Although prepared for the readers of a military publication the article is wholly free from professional technicalities. It contains information of startling importance and interest and should be brought home to those who give any attention to matters affecting our national defensive measures against possible foreign aggression.

Colonel Prentice starts out by showing that today the proper conception of the sinews of war has shifted from money to petroleum and its derivatives; and that the protection of unlimited supplies of petroleum derivatives, their storage depots, refineries and distributing facilities devolves upon the military establishment as one of its most important functions at the very outset of threatened hostile invasion, because their destruction or even serious damage would paralyze the transportation resources of the nation and prevent the mobilization of its military forces and its movement to threatened points.

The author states that the most pressing economic rivalry between nations today is undoubtedly competition for oil which is more and more coming to be the vital factor in modern progress. Today the very essence of the power of

the destroyer and battleship is oil and without it the navies of the world would become aimless masses of floating steel. Petroleum has interpenetrated the entire fabric of modern civilization by its use on sea and land and even in the clouds; it functions as a creative force in countless industries; it is the servant of the soldier in time of war, of the toiler in time of peace, the ministrant of pleasure, the source of prosperity for entire communities. What would happen if some act of war or cataclysm of nature should suddenly deprive us of our present stores of petroleum and its derivatives and at the same time demoralize our means of transporting, storing and refining the crude product?

One-fourth of the world's shipping is now oil driven. Three-fourths of the American Merchant Marine is oil burning and practically all harbor craft is equipped with gasoline engines. There would be silent factories with sullen industrials out of employment, adding to the confusion when the distribution of food now so dependent on motor vehicles ceased. The local stocks in the distributing stations would hardly last a day. In the farming sections there would be idle tractors. On railroads there would be many unmobilized oil burning locomotives. Immediate diminution and ultimate cessation of the supply of lubricants would soon fill sidings of railroads with locomotives and cars with burnt out bearings. How would we mobilize a modern army without an unlimited supply of petroleum derivatives? We could not rush antiaircraft guns to the defense of tank farms and refineries now in the environments of our great harbors. If it were war many coastal cities would soon be put under tribute and the enemy's air-borne forces given opportunity to penetrate inland for further destruction not only of visible stored supplies of petroleum but of the pipe lines for replacing reserves from distant interior sources of supply.

Colonel Prentice states that the greatest and most vital oil accumulations and oil refineries in the United States are open to attack from the sea. He gives some interesting statistics of the oil industry, from information obtained by personal observation and by conference with the higher officials engaged in that business, that relate to sources of production, of ownership of wells, pipe lines and pumping stations and storage tank farms, and lays emphasis on the fact that all too large a stock of storage depots, refineries and distributing facilities are located close to harbors within reach of long range naval guns at San Francisco, Los Angeles, Galveston, Port Arthur, New Orleans, Gulf Port, Pensacola, Savannah, Charleston, Norfolk, Baltimore, Philadelphia, Bayonne, Providence, Fall River and Boston—places upon which our entire import and export trade is based.

A very small proportion of tank storage or refining facilities are found close to producing wells. Herein lies the great menace to the oil industry in case of war and invasion and it is this phase of the situation that gives occasion to the intimate relation of the Coast Artillery Corps of the military establishment of the country to the petroleum industry in time of war, because the Coast Artillery Corps is now and has for some years been engaged in the development and use of antiaircraft weapons and means of defense against aircraft attacks. The great loading racks in the harbors of California and the Gulf, where tankers take on cargoes for North Atlantic ports, are all open to naval or air attacks. Crude oil goes by pipe lines to large refining centers and thence by short rail or motor hauls the finished products are taken to retail distributors who keep only a hand-to-mouth supply. If we were to lose a storage farm and refining plant like that at Bayonne, or if the refining and distributing plants near it were disturbed even for a day, millions of consumers would be immediately discommoded, prices would fluctuate and all depending industries be

distressed. In addition to other derivatives of petroleum the priceless accumulations of lubricants are also at these centers and their absence would at once be felt, not only by gas-driven engines and machines but also by all those operated by steam and water power.

The coastal establishments would naturally be the initial points of an enemy's attack, either by long range naval guns, or by aircraft. After having destroyed or crippled only the storage depots and refineries near the sea coast the enemy's next attack would be against the equally exposed pipe lines and pumping stations further inland, leading to the depots and refineries.

The author gives a brief statement of the measures that should be taken to enable the antiaircraft branch of the Coast Artillery service to meet air attacks against our sea coast petroleum depots and refining stations. But when we come to the practical details of the establishment and operation of all such measures of defense it is quite evident, even to the non-military observer, that they cannot be improvised after war has broken out or even after conditions arise that threaten and make war imminent. Such measures all require the manufacture in advance of unlimited quantities of the necessary appliances and equipments and the continued and incessant training of a large personnel to operate the equipment and prepare to lay out the defensive stations where protection is needed.

The farmer of Kansas and Iowa and generally the average inhabitant of the large and small towns and cities of the remote interior regions would not, in all probability, be greatly concerned at first with news that an invading enemy had succeeded in destroying some thousands of millions of gallons of oil stored at Bayonne, New Jersey, or San Pedro, California. It would, for an instant, be a welcome theme for exercise of the eloquence of the soap box brand of popular orators who would explain that it was part of a trick of the Standard Oil, Sinclair and Doheny "interests" to justify a raise in prices, and they would in that way soon recompense themselves for a temporary loss. But that the government should have taken steps in advance and expended money to provide protection against such raids would be protested by such people. But their awakening from the sense of security from the effects of such invasion, by reason of their great distance from the scene of operations, would be very drastic when they found that the increase in price had come about as was expected, but was immediately followed by exhaustion, within a day or two or even within a few hours, of all the local visible store of petroleum derivatives including lubricants, and seizure by federal, state and municipal authorities of all the larger inland storage supplies. The hand to mouth supplies of local dealers and distributors would be placed on a "rationing" basis for a short time, but the "rations" would grow shorter and shorter from day to day as the needs of the government for its military purposes increased.

Colonel Prentice confines himself to matters that concern the antiaircraft branch of the Coast Artillery Corps, leaving it to the Air Service to deal with and uphold its end which, as far as concerns needs for material and personnel to enable it to carry out its special functions, are as pressing as are those of the Coast Artillery. It is of course well understood that it is part of the duty of the Air Service arm to take the aggressive initiative in the attack of any enemy invading air force. But that does not diminish the importance and necessity for having at hand a well equipped and trained anti-aircraft artillery to meet, in a defensive position, those hostile aircraft that may succeed in breaking through or evading the attacks of our own air men. In

such conflicts our air service and antiaircraft artillery would necessarily take the part that belongs to them by acting in combination or as auxiliaries, one to the other, as the situation might require.

Colonel Prentice has performed a valuable service by his clear and convincing exposure of a danger that is a serious menace to one of the most important industries of our country, even a disturbance of which would bring with it incalculable financial loss, distress and suffering. He points out means for providing against it which should have the thoughtful consideration of all our people.

Teaching and Imparting Information

The following is a summary of a lecture recently delivered by Lt. Colonel William H. Wilson, Assistant Commandant of the Coast Artillery School to the student officers of that institution. Mimeographed copies of this Lecture, with bibliography, may be secured from the Secretary, Coast Artillery School, Fort Monroe, Virginia.

The system of military education since the war differs from that in use before the World War principally in the number of service schools, and the use and application of the old means and methods. Education today has been given a place of primary importance and its scope now includes technical, tactical, and strategical subjects and logistics; whereas before the war technique was the leading topic. In the old days attendance at Schools was not required of all officers after fifteen years of commissioned service; today they either attend the schools or are instructors regardless of length of service.

Education, the making of useful changes in human beings, in its application to the military, purposes to produce those changes in young officers as will best enable them to accomplish their mission. We may divide military education into four general classes; first, the basic or that common to all arms in addition to that required for a commission; the second, the technical, or that peculiar to the technique of the branch in which the officer is commissioned; the third, the tactical which has to do with the tactics of one's own arm, the other arms, and the combined arms; the fourth, a general knowledge of affairs of the day, including national and international subjects, civics and economics.

Teaching and imparting information is a life study and involves the understanding of psychology, pedagogy and logic.

The results of the researches into the human mind by the psychologist are taken by the pedagogue, analyzed, studied, classified, and their deductions passed on to the teacher in a more or less codified form.

Psychology is not yet an exact science, hence the science of teaching is still undeveloped; but the art of teaching has sufficient well tested principles to enable the teacher to make intelligent and useful application of them.

It is a well recognized fact that all human beings have the same physical organs of the reception and perception of stimuli, hence we are qualitatively alike. However, the variations in those organs, or abilities, from one individual to another vary in the strength of those abilities—and the differences are quantitative.

What the student learns and how he learns depends upon what and how he perceives or observes. Therefore, it is important to increase the accuracy, scope and fidelity of observation of the student.

There are several factors that directly affect the rate of progress of learning; the lessons may be too long; the student forgets; he is fatigued; he is

unable to concentrate; he has no incentive to learn or lacks interest in the subject; or he may be lacking in his powers of imagery.

Physical fitness is essential to mental fitness.

The general qualifications of a good instructor may be summed up as follows: mental fitness; physical fitness; temperament; force and zeal; patience; thoroughness; a sense of humor; loyalty to doctrine; an understanding of the student.

Lessons are usually of four kinds; first, lessons of information; second, lessons of thought; third, lessons of appreciation; and lessons of skill. By combining the first two we have the mental process known as the art of reasoning—or logic.

It has been stated by educationalists that the future is to be an oral and not a written one, and the instructor is rare whose tendency is toward too much oral work.

As for methods, there are three generally used. The lecture, the topical, and the question methods. The latter gives the best results in the class room and may be used to advantage in the lecture room. The first method, if not abused and when intelligently and humanely employed is good for imparting information. The weakness of the topical method is that care must be taken not to give the student a subject about which he has no knowledge as he is prone to memorize work in such cases.

We do not teach unless somebody learns!

It is necessary in planning lessons to have in mind the purpose of each one and then to adopt the method best suited to accomplish that purpose; stick to essential facts and omit all else. The problem should make an appeal to the student in some form or another. Never be the umpire between the student and the book!

Tests in the form of reviews and examinations serve a good purpose only when given to emphasize essential material in the student's mental storehouse. These are tests for measuring attainment which has resulted from training.

The Binet, the Alpha, and other similar tests measure inborn ability, and should not be confused with those above.

Programs, outlines of training, and schedules, the program completed for the instructor and student alike, are required wherever training is practiced. Organization is the basis of efficient effort in all things.

Consolidation of Coast and Field Considered

The proposal for the consolidation of the Coast and Field Artillery will be the center of a very earnest discussion in the War Department in the next six weeks, according to authentic information, and a recommendation for legislation which would authorize the consolidation may be submitted to Congress at the approaching session.

Although the subject has been discussed ever since the World War, the first official recommendation was contained in the annual report of Maj. Gen. F. W. Coe, Chief of Coast Artillery, which was submitted by the Secretary of War to Congress in 1921. Pay legislation and a reorganization of the Army absorbed the attention of the authorities to such an extent, according to report, that General Coe's recommendation was neglected.

To divide the function of the Field Artillery from the Coast Artillery a General Order was published by the War Department. It provides:

"1. The Coast Artillery will furnish all artillery necessary for the fixed and mobile elements of land and coast fortifications, all railroad artillery, all antiaircraft artillery and all trench mortar artillery necessary for use in connection either with fixed defenses or with armies in the field.

"2. All artillery other than that mentioned in paragraph 1, and primarily intended for use in combats with armies in the field, will be furnished by the Field Artillery of the Regular Army, the National Guard and the Organized Reserves, but this shall not be construed to prohibit the organization within the Coast Artillery of such mobile units as may be needed in land or coast fortifications or the employment of such units with the field armies whenever or wherever conditions of combat indicate the desirability of such employment."

CLASH ON ANTI-AIRCRAFT

This General Order, it was assumed at the time, would forever settle the status of Coast and Field Artillery. However, there are constantly coming up in the War Department questions as to the dividing line between the functions of the two Artilleries.

The comments of General Coe on the General Order in his report of 1921 were really a forecast of what took place in the relations between the two Artilleries and in the War Department since that date, subsequent events proved.

Not only the Field Artillery officers, but officers of other branches, are insisting that the anti-aircraft artillery should be transferred to the Field Artillery. In many ways the interests between the two Services are clashing and harmony, it is claimed, can only be obtained by consolidation.

In referring to these conditions, General Coe states, in his annual report:

"These instructions permit the Coast Artillery Corps to prepare, in an adequate manner, to carry out its mission in any future emergency. It is, however, apparent to me that various questions will arise in the interpretation of these instructions, and that upon such interpretation will depend to greater or lesser sense the state of preparedness of the two branches of artillery to fulfill in the most effective manner their missions in both peace and war. All of these questions will arise from the fact that there are two separate branches of artillery with no natural line of division, and that provision is lacking for a properly constituted agency to harmonize administrative and technical details of the two branches, especially in the borderland where they come together.

"At the outset of the development of modern artillery in this country no such line existed. The division gradually came into existence through two causes: first, the limitation upon the mobile caliber imposed by the tractive force, viz., the horse; second, the erroneous conception that Coast Defense guns on fixed mounts afford by themselves a protection which, in fact, can only be provided by an army. This idea was carried so far at one time as to leave the proposition that Coast Artillery might be entirely separated from the rest of the Army.

"It took the World War with its experiences to teach us that guns, of whatever caliber and however mounted, constitute nothing more than a supporting agency for the final force—the man with the rifle and bayonet. Our harbor fortifications today provide strong points in a defensive line where future battles may have to be fought. If the battle line moves to other continents again, as in the World War, the heaviest guns will follow."

OLD ARGUMENTS "FALLACIOUS"

It is being pointed out that the arguments of 1906 and 1907, which led to the division of the artillery of the Army into two branches were proven to

be fallacies in the World War. The introduction of motor transportation in artillery has made the larger caliber guns mobile. With railroad transportation the largest guns are now mobile and can be moved with greater rapidity than horse artillery.

But the chief argument of those who are now in favor of consolidation is in the development of anti-aircraft artillery. It is insisted that anti-aircraft artillery belongs to both branches of the artillery.

While the advocates of the consolidation admit that the present system of manning and operating the larger guns at the Coast Artillery posts is radically different from the Field Artillery, it is argued that the Coast Artillery system of training and instruction should be changed to fit it for field service.

Attention is called to the fact that Coast Artillery was called into service on the Mexican border. This was only a minor emergency, and in the event of a defensive war Coast Artillerymen from one coast might be shifted to the other and serve in the field with mobile artillery and even infantry.

The proposition is a radical one and will provoke general discussion throughout the Army if it becomes apparent that the Secretary of War intends to urge legislation for the consolidation, interested officers affirm.—*Army & Navy Journal, October 18.*

Military Policy of the World War

Our conduct of the World War was by far the most intelligent, thorough, comprehensive, and efficient in our entire military history, or perhaps it would be more correct to say the least inefficient. To the student of that history it was a refreshing proof of the inherent good sense of the American people, their patriotism, and their ability to meet an emergency, even when unprepared through their own neglect.

For the first time Congress placed the entire resources of the nation at the disposal of the President and the military authorities, and voted funds without stint or hesitation. Throughout the war the President was virtually a military dictator, almost free from any hampering restrictions upon his conduct and with ample funds at his disposal.

Our policy for the World War was, with one notable defect, probably as effective a policy as could have been adopted in our state of unpreparedness. Granted that we were unprepared, almost all the mistakes of the past were avoided. Chief amongst the wise measures taken were the following:

1. The prompt passage of a draft or compulsory service act and concomitant discontinuance of voluntary service.
2. Ample funds and ample powers granted to the President as the constitutional Commander-in-chief, from the outset.
3. Appointment of a supreme commander of all military forces in the field, *from the outset*.
4. Enlistments for the war.
5. Expansion of the Regular Army.
6. Appointment of all officers by Federal authority.
7. A liberal and effective use of trained regular officers to instruct and lead the new levies, not only as brigade and division commanders, but in all grades. Even non-commissioned officers were thus employed, great numbers of them being given temporary commissions, under which they rendered conspicuously efficient service.

8. Recalling to service former officers, including retired officers fit for duty.
9. An effective organization of large as well as small units, uniform throughout the army.
10. Provision for replacements to keep all units up to strength.
11. Systematic and comprehensive measures for the mobilization of material resources. These measures, however, had one conspicuous deficiency, later referred to—there was no conscription for non-military service.
12. Appreciation on the part of Congress and of the nation at large of the magnitude of our task, resulting in liberal provisions for almost every phase of our participation, in sharp contrast to the pennywise, makeshift procedure of the past. We faced a large task and we made provisions for it on a large scale.

A number of other miscellaneous abuses of previous wars were rigorously suppressed. The Secretary of War performed his proper functions, and did not dictate the operations of the field army. There was a minimum of political interference in the conduct of the war, and the pernicious principle of "state rights", with all its resulting abuses, was entirely suppressed. An effective press censorship was maintained, that is to say the press was not allowed to betray any secret plans. The evils of desertion and unauthorized absence were relatively less than in any previous war. The health of the army was well conserved, and over 85% of battle-wounded were ultimately returned to duty—a most creditable record, especially as the wounds inflicted during this war were far more severe than in any previous conflict.

The reasons for all this were many, but two chief reasons may be mentioned. First, we had for some years been observing the war, and had formed some concept of its magnitude and severity and some appreciation of what was expected of us. Second, our allies sent to America some of their ablest officers and civil officials to plead with us to avoid the mistakes of the past, and adopt from the outset a sound policy for the effective prosecution of the war. To the credit of Congress be it said that it harkened to the wise counsel of our allies.

The notable defect of our policy, to which reference has been made, was one of which our previous experience had given us little warning. It was the failure to draft our citizens for necessary non-military as well as military service, and to fix maximum limits of prices for wages and materials. While the soldier who was drafted went to the front and risked life and limb at a dollar a day and board, the man who was not drafted stayed at home safe and, taking advantage of the nation's need, demanded and received unheard of wages for his services. Mechanics in the ship-yards received higher wages than the naval constructors who designed the vessels. A negro coal heaver in a hospital received greater compensation than the expert operating surgeons. This produced a spirit of discontent amongst the soldiery, and substituted greed and selfishness for patriotism amongst the workers at home. It was largely responsible for a lowering of moral standards, inflation of prices for all commodities and services, and the subsequent period of painful deflation and readjustment following the war. We have remarked that our previous experiences had given us no precedents in this phase of warfare, either to copy or to avoid. In no previous war had there been anything approaching the expenditures of ammunition and other supplies which characterized the World War. The necessity for the organization of industry on a basis similar to the organization of the armed forces, had never before been so apparent.—*"Wars of the American Nation". The New Military Library, Annapolis, Md.*

Losses from Disease in the World War Armies

By HAROLD G. VILLARD

[REPRINTED BY SPECIAL PERMISSION OF *The Current History Magazine*, A MONTHLY PERIODICAL
PUBLISHED BY THE NEW YORK TIMES COMPANY.]

When, shortly after the start of the World War, it was realized that the struggle would be of long duration, medical opinion was divided regarding the extent to which the hostile armies would be ravaged by disease. In most previous wars of any consequence many more soldiers had perished from fever or contagion than had died on the field of battle. This was true even of the majority of the conflicts waged in recent times, as will be seen by glancing at the following table prepared by the German Statistical Office, which gives the number of deaths from military operations and disease in the leading wars that took place between 1854 and 1904:

DEATHS FROM ENEMY ACTION AND DISEASE IN WARS WAGED SINCE 1854

WAR	Duration in Months	Army	Thousands	Average No. Effectives		—No. Deaths Per 1,000— Effectives		Total
				in Enemy	Action	Disease		
Crimean, 1854-56	28	French	309	58.8	191.7	250.4		
		British	98	46.9	179.6	226.7		
Austro-Italian, 1859-60	12	French	130	42.9	105.8	148.7		
Danish-Prussian, 1864	9	Prussian	63	11.6	4.0	16.5		
		Danish	54	26.8	15.1	41.9		
Austro-Prussian, 1866	8	Prussian	280	14.3	18.6	32.9		
Franco-Prussian, 1870-71	12	German	815	34.7	18.8	58.0		
Russo-Turkish, 1877-78	28	Russian	839	97.0	26.7	125.7		
Chinese-Japanese, 1894-95	6	Japanese	61	15.9	51.6	67.9		
Greek-Turkish, 1897	—	Greek	66	10.5	—	—		
Spanish-American, 1898-99	12	American	211	4.6	25.7	30.8		
Anglo-Boer, 1899-1902	23	British	250	25.5	44.4	69.9		
Russo-Japanese, 1904-05	28	Japanese	1200	58.5	22.6	81.1		
		Russian	1365	24.9	6.8	31.7		

The fear felt at the outbreak of the World War that disease and pestilence would play a decisive role in the conflict and determine the outcome of campaigns proved soon to be unfounded. Where the latest and most approved sanitary measures were applied and up-to-date preventive medicines used, no serious outbreak of infectious ailments occurred among either the civilian population or the military forces. During the fifty-three months of the war only one great epidemic occurred. This was the scourge of typhus which claimed from 100,000 to 135,000 victims in the Serbian and an unknown total in the Russian army. Both Russia and Serbia lacked, however, the medical and sanitary personnel required successfully to combat this disease, which caused only relatively few deaths in the other armies.

In many former conflicts smallpox and typhoid fever were the chief causes of death among those bearing arms. During the Franco-Prussian War of 1870-71, which occurred before the days of compulsory vaccination, 23,469 French soldiers died of smallpox. In the World War not a single Canadian and only twenty-two German soldiers died of this disease. In the course of the Anglo-

GERMAN WAR LOSSES FROM DISEASE AND ENEMY ACTION

Year	Average No. Effectives in Thousands	Deaths in Thousands			No. Deaths per 1,000 Effectives			
		Enemy	Action	Disease	Enemy	Action	Disease	
1914	5,080	231	14	46.0	2.7	48.7		
1915	6,767	404	34	59.6	5.1	64.7		
1916	7,620	317	38	41.5	3.6	45.1		
1917	7,917	249	36	31.5	4.6	36.1		
1918	8,000	319	65	39.8	8.1	47.9		
1919	—	3	0	—	—	—	—	
Total	—	1,523	188	—	—	—	—	

Boer war 57,684 out of 208,326 British soldiers engaged contracted typhoid fever. Of these 8,022 died and 19,454 had to be invalided home. Out of every 1,000 effectives 18.6 succumbed to this disease as compared with 12.9 that died of wounds and 9.59 that were killed in action. In the World War the losses from typhoid fever were comparatively trivial. Thus in the American first army of 1,000,000 men there were but seventeen typhoid cases, while the Canadian forces with 420,000 enlisted men lost only fourteen men from this once dreaded disease.

Professor Harold Westerwald of the University of Copenhagen estimates that of the 11,000,000 soldiers who are supposed to have laid down their lives in the World War only 3,000,000 fell victims to diseases, as compared with 8,000,000 whose deaths were directly ascribable to war operations. Unfortunately, owing to the absence of detailed statistics, it is impossible to apportion these losses from sickness exactly. According to Professor G. Montara of Rome, the Italian Army, which was forty-two months in the field and for which 5,250,000 men were mobilized, lost 130,000 effectives, or twenty-five per 1,000, from sickness and 330,000, or sixty-three per 1,000, in consequence of actual fighting.

So far Germany is the only one of the great belligerent nations to disclose fully the disease mortality rate of her armies. In an article published not long ago in *Wirtschaft und Statistik*, the official organ of the German Statistical Office, it is stated that the deaths of persons in the German military forces from the outbreak of the war to the year 1919 numbered 1,711,154. Of these only 187,973, or one in nine, died as the result of disease, an astonishingly good showing, all things considered. It is much better than the records of the Russian troops. The German authorities calculate that, with the statistics for the Caucasian armies missing, 33.90 per 1,000 of the 12,500,000 Russians mobilized in the course of the war died of disease, while 89.2 per 1,000 were either killed outright or succumbed to wounds. With 13,250,000 men mobilized, the Germans estimate their losses at 128.6 per 1,000, of which only 13.8 were due to disease. In comparing the German and Russian records it must be borne in mind that the Russians stopped fighting at the end of thirty-nine months, while the German forces were under fire for fifty-three months. By years the German losses group themselves as shown at the foot of the page preceding.

It is interesting to recall that in our Civil War the Union Army, with an estimated strength of 806,755 men, lost annually through deaths from disease 66.1 per 1,000 effectives. The following diseases were responsible for the German Army's sickness death list:

Ailment	No. of Deaths
Unknown	39,003
Pneumonia	27,371
Pulmonary tuberculosis	19,886
Influenza	14,161
Typhus	10,548
Disorders of circulatory system	9,738
Wound infections	9,350
Dysentery	8,040
Diseases of digestive organs	5,174
Diseases of respiratory organs	5,126
Suicides	5,106
Nervous disorders	4,974
Unknown causes	4,872
Urinary and sexual diseases	4,700
Catarrh of stomach, diarrhea, etc.	2,317
Cancer	2,236
Tuberculosis	2,087
Appendicitis	1,977
Cholera	1,858
Spotted fever	1,755
Apoplexy	1,234
Diphtheria	1,138

Cerebro-spinal meningitis	1,059
Neoplasms	1,058
Erysipelas	706
Malaria	703
Scarlet fever	580
Acute military tuberculosis	454
Murder and assault	294
Venereal diseases	224
Recurrent fever	47
Infectious animal diseases	45
Smallpox	28
Military executions	19
Antinomykose	15
Measles	14
Whooping cough	5
Other infectious diseases	8
Infantile paralysis	5
Chickenpox	1
Mumps	1
Total	187,973

It will be seen that pneumonia, for which an antidote has yet to be found, caused more deaths in the German forces than any other single disease. The American Army had a similar experience. Its annual death rate from disease during the World War has been estimated at 14.8 per 1,000 effectives of which twelve, of over four-fifths, were due to epidemic pneumonia. Pulmonary tuberculosis, influenza and typhus proved to be the next greatest scourges in the German ranks, which were little depleted by dysentery and malaria. The former disease contributed largely to the failure of the Allies' Gallipoli campaign in 1915. It broke out in a virulent form among the British troops employed in the month of August and was responsible for most of the 120,000 casualties evacuated from the peninsula on account of sickness during the ensuing ninety days. About 5 per cent. of these ended fatally. Malaria came near rendering futile the Saloniki and Mesopotamian campaigns of the Allies.

In order to complete the medical history of the war it is to be hoped that the German officials will some day publish the number and nature of the non-fatal cases of illness that occurred among the German troops. On the allied side we are told that in France the average evacuation for sickness from armies to base was 0.6 per cent of the registered strength weekly. Nor should the fact be overlooked that in 1920 65 per cent. of all war pensioners were classified as suffering from disease as contrasted with 35 per cent. disabled by wounds or injuries. The triumph of preventive medicine has been hailed as the outstanding feature of the World War, but even if further great advances should be made in our knowledge of medicine and sanitation, no army can expect absolute immunity from sickness. Science will never be able to prevent soldiers whose vitality has been lowered by over-exertion, exposure to the elements, lack of sleep and poor food from falling a prey to disease.

COAST ARTILLERY BOARD NOTES

Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration.—R. S. ABERNETHY, Col., C. A. C., President Coast Artillery Board.

New Projects Initiated During the Month of October

Project No. 290, Test of Perrin Telesitemeter.—The Perrin Telesitemeter is a sound locating apparatus designed to permit the location of aeroplanes by the use of sound. The instrument has been received by the Coast Artillery Board and is now undergoing a series of tests relative to its advantages and disadvantages for service use.

Project No. 291, Test of Navy Sound Plotting Board.—The Navy Sound Plotting Board has been received by the Coast Artillery Board. Tests are being carried on relative to its merits in plotting the positions of airplanes by use of sound in order that they may be either illuminated and then fired on by antiaircraft guns, or without the use of lights, positions of the plane can be plotted with such accuracy that they may be fired on using sound data only.

Project No. 292, Test of 3-inch A. A. Gun, Model 1923E.—The test of the 3-inch A. A. Gun, Model 1923E, has been held up awaiting the arrival of the gun at Fort Monroe. When the gun is received tests will be made to determine its suitability for adoption as a standard 3-inch mobile antiaircraft gun.

Project No. 293, Proposed Antiaircraft Sights.—The Coast Artillery Board has submitted certain modifications it is believed required in order to make the proposed A. A. sight more suitable for service conditions. The sight will allow either Case I or Case III firing as desired.

Project No. 294, Test of V. C. Corrector.—The Coast Artillery Board has received for test a V. C. Corrector. This instrument is an Antiaircraft data computer designed to furnish data for either Case I or Case III firing. Tests are to be conducted to determine the advantages and disadvantages of this type of materiel.

Project No. 295, Cover for Rifle, Caliber .30.—The question has been raised as to whether or not the Coast Artillery service desires to have this item continued as an article of issue to Coast Artillery Troops in whole or in part.

Project No. 297, Test of Gas Mask Carrier.—The Coast Artillery Board has received an Experimental Model 1924 Gas Mask Carrier for test.

Project No. 298, Standard Nomenclature List No. D-9, 3-inch A. A. Gun, Model 1917.—Ordnance standard nomenclature list for the 3-inch gun,

Model 1917, has been received by the Coast Artillery Board. It is being checked to determine its suitability for service requirements.

Project No. 299, Comments on T. R. No. 50-80, The Soldier—The Infantry Pack.—This Training Regulation has been received by the Coast Artillery Board for comment and recommendations.

Project No. 300, Test of Kites for use as Antiaircraft Targets.—Certain types of box kites have been received by the Coast Artillery Board and are to be tested to determine their suitability for training antiaircraft artillery organizations in the conduct of fire against moving targets.

Project No. 301, Annual Survey of Adopted Types of Equipment and Armament.—The Coast Artillery Board has been directed to make an annual survey of adopted types of equipment and armament with which troops of the Coast Artillery are equipped in order to determine if such types are up to date and satisfactory for an emergency, and to recommend the adoption of such new types as may seem desirable.

Project No. 302, Comments on Training Regulations No. 330-115, Ammunition for 240-mm. Howitzer.—Copy of proposed Training Regulations No. 330-115, has been received by the Coast Artillery Board for comment and recommendation.

Project No. 303, Data Computer, A. A. Model 1916 (Brocq Corrector).—The question as to whether the Data Computer, A. A., Model 1917 (R. A. Corrector), or the Data Computer, A. A. Model 1916 (Brocq Corrector), is most suitable for the standard equipment of Antiaircraft gun batteries has been raised by the Chief of Coast Artillery. A study is being prepared by the Coast Artillery Board showing the relative merits of both instruments prior to a recommendation as to the most suitable type for service conditions.

Completed Projects

Project No. 200, Time Interval Apparatus for Mobile Seacoast Artillery.—In January, 1924, the Coast Artillery Board received from the Signal Corps one motor driven time interval apparatus constructed in conformity with recommendations made by the Board in its report on Project No. 56, Time Interval Apparatus For Mobile Artillery Units. At the same time the Board received from the Signal Corps a clock driven time interval apparatus for test in comparison with the motor driven apparatus.

Both pieces of apparatus were subjected to a thorough test by the Coast Artillery Board and by organizations of the 51st and 52nd Artillery at Fort Eustis, Va. These tests were for the purpose of determining for each apparatus the variations in the time interval, its dependability, and its suitability for mobile artillery.

The motor driven apparatus is shown in Figures 1 and 2. The motor is driven by a 6-volt battery. A worm on one end of the armature shaft drives a worm-wheel. Rigidly attached to an extension of the worm-wheel shaft is a pinion which meshes with a large spur gear. An extension of the spur gear shaft carries a detachable time interval wheel. Groups of three notches are cut in the periphery of the wheel at equidistant intervals. The notches on the time interval wheel actuate a contactor which is in series with a relay and the battery.

One pair of binding posts on the relay are to be connected in series with an external source of power and the time interval bells. The speed of the motor is regulated by means of a governor on the armature shaft, similar to the well known governor on a Victrola motor. Five time interval wheels are supplied with the apparatus. These wheels provide three strokes of a bell every 10, 12, 15, 20 and 30 seconds respectively.

The clock-driven apparatus consists of a clock mechanism in which the power device for driving the contact wheel is driven independently of the clock mechanism proper, but is interlocked with the latter through an escapement. This permits considerable friction to be placed on the time interval contact wheel

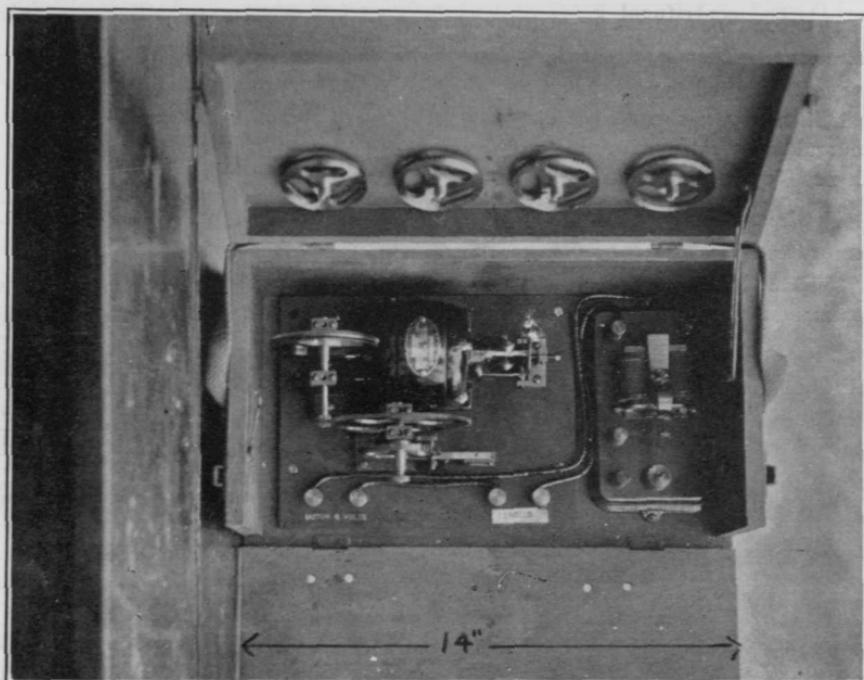


FIG. 1

without interfering with the time keeping qualities of the clock movement. The circuit closer, actuated by the contact wheel, is in series with a relay. The relay operates satisfactorily with two to four dry cells or a four to six volt storage battery. The relay is for use with time interval bells on a circuit requiring more than six volts.

The power clock operated satisfactorily throughout the tests. Its time variation is negligible. It is doubtful, however, that such a delicate piece of mechanism can withstand the shocks and disturbance incident to service mobile artillery.

The motor-driven apparatus is rugged and dependable. Its time variation can easily be kept within the limits recommended by the Board in 1921, to-wit: 10 minutes in 24 hours. The lubricating system operates satisfactorily.

The Board considers the motor driven type of apparatus to be the more suitable of the two. However, certain minor defects in the model submitted to the Board for test need to be corrected before the apparatus can be considered entirely satisfactory. Briefly, these are as follows:

(1) After 30 minutes running the casing of the motor becomes so hot that one can barely keep his hand on it. Such heating is almost certain in time to cause deterioration of the insulation.

(2) All storage batteries in hands of mobile artillery units are either 4 or 8-volt batteries. The motor on the time interval mechanism is designed to be driven by a 6-volt motor. A rheostat should be placed in the line between the battery and the motor to enable one 8 volt or two 4 volt batteries to be used with the apparatus.

(3) During the test one of the spring leaves on the governor broke. It was replaced locally. A number of spare spring leaves should be furnished with the mechanism.

(4) The centrifugal governor with which the model is equipped operates satisfactorily. However, speed adjustment is somewhat difficult with the screw provided for varying the tension of the governor spring because the use of a

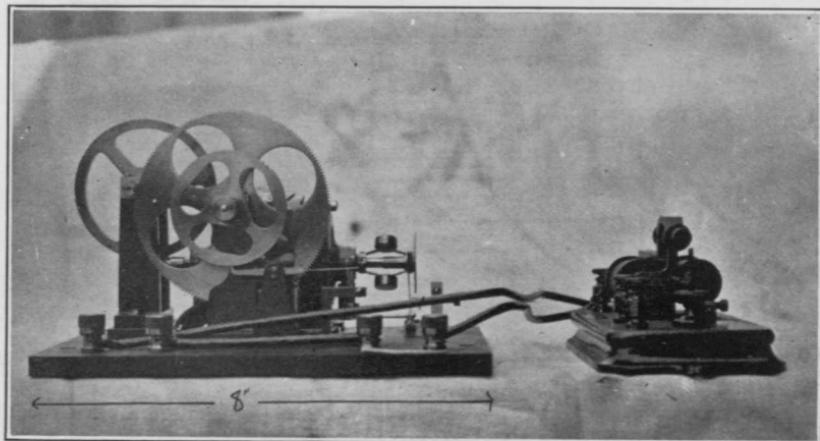


FIG. 2

screwdriver is necessary. A larger screw, with a knurled head, that could be turned by hand, is desirable.

(5) A switch, preferably of the snap type, should be placed on the mechanism in one of the leads from the battery connection posts.

In conjunction with the test of the two time interval mechanisms the Board undertook a study to determine the best method of transmitting a time interval signal to observing stations and guns in mobile artillery units. Since the conclusions at which the Board has arrived on the latter subject have considerable influence on the recommendations it proposes to make in regard to the motor driven apparatus, a discussion of a time interval system for mobile artillery will be made before taking up changes or modifications in the motor-driven mechanism.

The disadvantages of the time interval bell system now standard for harbor defenses for use with mobile artillery have been discussed in Coast Artillery Board Projects Nos. 58 and 111. The principal objections to the harbor defense system is the weight of the equipment and amount of power required. The equipment is entirely too cumbersome for mobile artillery. These considerations are not particularly important in the case of railway artillery, but for tractor drawn artillery they constitute serious disadvantages.

During the past two years experiments have been carried out at various posts with a view to obtaining a time interval system suitable for mobile artillery. These experiments have usually consisted of introducing a buzzer note into the telephone line leading to observing stations and guns. Generally, this has been accomplished by utilizing for the make and break mechanism either the T. I. clock formerly standard for harbor defenses, or the motor driven time interval apparatus described on page 15, Chapter IV, Signal Corps Manual No. 8. Both of these mechanisms have been discarded as standard equipment for harbor defenses. The buzzer note has been introduced into the telephone line by utilizing a buzzer and a telephone transformer. The secondary of the transformer has been removed and several new secondaries, depending upon the number of phones requiring the signal, have been wound over the primary. In

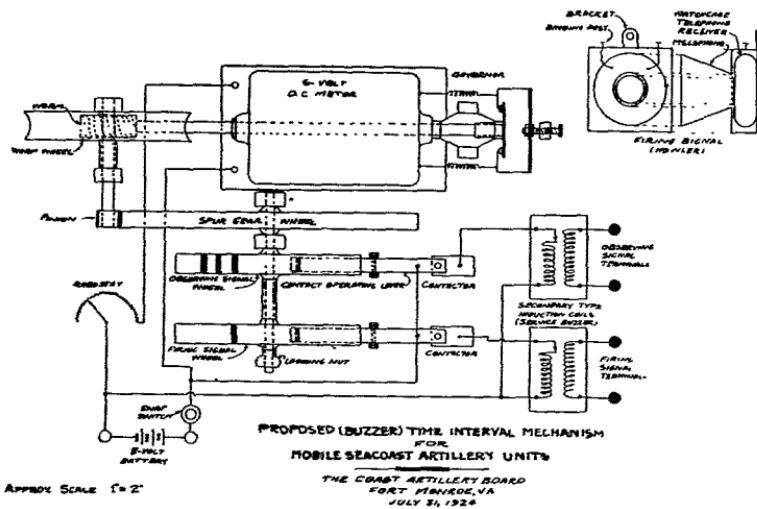


FIG. 3

all of these experiments it has been demonstrated that the scheme of having a buzzer note in the telephone for indicating time intervals is entirely practicable and satisfactory.

The time interval system described in the following paragraphs is based on that developed in the 51st Artillery at Fort Eustis, Va., under the direction of Lieutenant Colonel James B. Taylor, C. A. C. The Board believes this system to be the most practicable, and at the same time the most simple, of all those that have been tested or considered. The basis of it is buzzer notes in the telephone receiver for the observing signal—three notes every thirty seconds—and a vibratory signal in the plotting rooms and at the guns every ten, twenty, or thirty seconds, as may be required by a particular battery. Standard commercial electrical materiel is utilized throughout. The motor-driven mechanism tested by the Board requires certain simple modifications to adapt it to this particular system. These consist of:

- (1) Omitting the relay.
 - (2) Increasing the length of the shaft carrying the T. I. wheel so as to carry an additional T. I. wheel.
 - (3) Adding a contactor to be operated by the additional T. I. wheel.

(4) Adding two secondary type induction coils similar to those in the Service Buzzer.

The system also requires a firing signal of the vibrating diaphragm type referred to herein as a "howler".

Figure 3 shows the modified time interval mechanism and a howler. The howler is simply a watch case type of telephone receiver mounted in a small box with a short megaphone attached to it just in front of the receiver diaphragm. This device produces a note loud enough to be heard above the noise of loading and laying the piece. One howler is provided for the plotting room and one for each gun of a battery.

The method of introducing the buzzer tone into the observing station telephone line is extremely simple. It is shown in Figure 4. A lead from one of the "observing signal terminals" on the T. I. mechanism is connected to *one* side

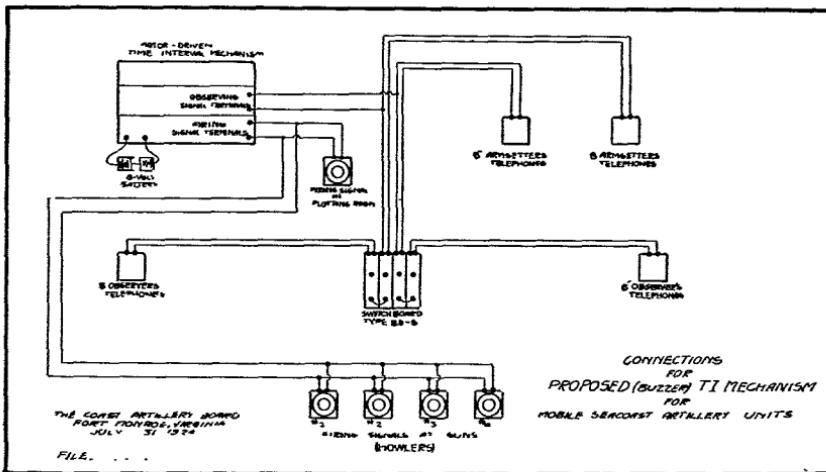


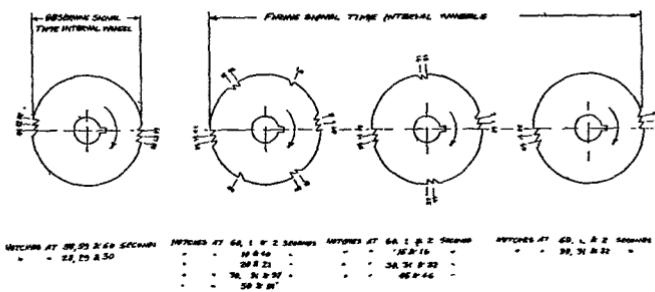
FIG. 4

(only) of the pair of wires to which the B' observer's phone is connected, or to the pair to which the B' armsetter's phone is connected. The other terminal is connected in like manner to *one* side of the pair to the B" observer's phone or to the B" armsetter's phone. The connections to the telephone lines are made at the most convenient place, generally at the switchboard. In the event of there being a B''' station, connection is made as above from one terminal of the mechanism to one side of the pair of telephone lines, and the other side of the pair is grounded. Since there is neither physical nor magnetic connection through the time interval mechanism between the two observer-armsetter lines, there is neither cross-talk nor transmission loss. The system is simple, rugged and dependable.

For the T. I. mechanism modified as outlined in the foregoing paragraphs but one of the five observing signal time interval wheels with which the mechanism tested by the Board is provided, is necessary. This one wheel should be notched to provide three signals one second apart every thirty seconds. With our present method of fire control it is ordinarily impracticable to plot predicted positions of a moving target at intervals smaller than 30 seconds.

For the firing signal three wheels should be provided. Diagrams of the observing signal wheel and firing signal wheels are shown in Figure 5. (The first signal given by each of these three wheels at 0 seconds and 30 seconds should be coincident with the third signal given by the observing signal wheels). The purpose of the particular notching of the wheels shown in Figure 5 is to enable the procedure outlined in Coast Artillery Board Project No. 75, "Fire Control system for 155-mm. G. P. F's.", or similar procedure, for interpolating elevations and azimuths to be carried out, not only for 155's, but for all other artillery firing at moving targets. The shaft upon which the firing signal wheels are mounted and the wheel bearings should be so shaped that the wheels will fit in one position only in order that synchronism of the firing signal wheel with the observing signal wheel may be insured.

The time interval mechanism described in the foregoing paragraphs while designed primarily for mobile seacoast artillery is, on account of its simplicity



SCHEMATIC DIAGRAM
TIME INTERVAL WHEELS
FOR
PROPOSED (BUZZER) TIME INTERVAL MECHANISM
FOR
MOBILE SEACOAST ARTILLERY UNITS
THE COAST ARTILLERY BOARD
FORT MONMOUTH, N.J.
JULY 31, 1926

FIG. 5

and low cost, well suited for emergency use in batteries of harbor defenses. In the event of damage to the harbor defense time interval mechanism or lines, a battery commander is forced to rely upon the use of a stop watch for continuing observations on a target and, in some batteries, for firing the guns. The buzzer time interval mechanism described herein, once connected up, can be placed in operation merely by throwing the snap switch on the mechanism itself, thereby reducing to an absolute minimum any delay incident to interruption of the standard time interval system.

Conclusions: (1) The Board is of the opinion that both the motor-driven and the clock-driven mechanisms tested are satisfactory devices for indicating time intervals.

(2) That the motor-driven type is more suitable for use by mobile seacoast artillery units than the clock-driven.

(3) That the motor-driven time interval mechanism modified as described herein is entirely suitable for all classes of mobile seacoast artillery that require tracking of moving targets.

(4) That the modified mechanism is well suited for use as an emergency time interval system in batteries of harbor defenses.

Recommendations: (1) The Board recommended that the Signal Corps be requested to construct four motor-driven time interval mechanisms modified as described herein.

(2) That each complete time interval mechanism include five "howler" firing signals constructed along the lines described.

(3) That upon completion of the four complete mechanisms (including howlers) they be issued for test as follows:

1 to the Coast Artillery Board.

1 to the 51st Artillery, C. A. C., Fort Eustis, Va.

1 to 55th Artillery, C. A. C., Fort Ruger, H. T.

1 to 59th Artillery, C. A. C., Fort Mills, P. I.

(4) That consideration be given to the issue to each battery of harbor defense artillery for emergency use one time interval mechanism of the type which shall have been adopted as standard for mobile seacoast artillery.

(5) That consideration be given to the adoption of the buzzer time interval system as standard in new harbor defense installations projected for future installation.

Note: The above recommendations were concurred in by the Chief of Coast Artillery under date of August 26, 1924, as follows:

"2. The recommendations contained in (1) (2) and (3) above are concurred in.

"3. It is requested that an estimate of the cost of a motor driven time interval mechanism, modified as described herein be furnished.

"4. Comment and recommendations are requested reference the recommendation contained in (5) above."

BOOK REVIEWS

The Naval History of the World War. By T. G. Frothingham. Harvard University Press, Cambridge. 5½" x 8½". 349 pp. Ill., \$3.75.

Much of what has been written on the naval operations of the World War has been in the nature of apology, explanation or argument. Indeed, it has seemed too early after the event to hope for a dispassionate narrative of events free of partisanship.

Captain Thomas G. Frothingham, U. S. R., in "The Naval History of the World War—Offensive Operations 1914-1915," approaches the attitude of the true historian. His narrative is readable, logical, and well arranged. It is as accurate as available sources permit and though brief omits nothing important, and his comments are as illuminating as unbiased.

In another respect also is this work a bright and shining exception. Captain Frothingham neither commends the Entente navies for winning the war, nor condemns them for failing to win it. Indeed, he sees clearly that victory had to be, and was, achieved on land. Two comments seem worth quoting:

"Support of the Navy to secure a decision by the Army should always be considered a primary mission of the Navy....."(p. 155).

".....it was once more proved that possession and use of the seas must always be the greatest factor in gathering strength for waging war and in sustaining this strength"(p. 142).

But it cannot be said that the writer has always kept his own lesson in mind. Indeed he is severe in his condemnation of the "neglect of the Germans to prepare for a full use of the naval arm in their great offensive in 1914". We cannot agree that the Germans were wrong in refusing to be diverted in any way from the attempt to destroy the army of France. It is true that prevention of the transfer of British troops to France might have influenced the result, but this was impossible.

During the war, many students of naval operations were perplexed by the failure of the Allied navies to seek the mastery of the Baltic. The Baltic, and not (as the author would have us believe) the Dardanelles, would have been the "richest prize in the world for the Entente navies." It now appears that the only naval operations in the Baltic given serious consideration were connected with Lord Fisher's beautiful dream of a landing on the Pomeranian Coast. While Captain Frothingham repeatedly points out the tremendous influence of the fear of invasion of Great Britain upon British naval strategy, he appears not to see clearly the relation between this obsession and the inactivity in the Baltic.

It is probable that many readers will find the writer too severe upon Spee's disastrous Falkland raid; upon the tardiness of the German submarine campaign against Allied commerce; upon the Dardanelles project; and upon the British naval strategy throughout.

But enough has been said here to indicate that this volume, with the others to come, will be an interesting contribution to the history of the War, and one conducive to thought.

The diagrammatic maps are conveniently bound, clear, and sufficient for their purpose except as relates to the British Channel area, and a complete index is provided.

GALAPAGOS: *World's End*. By William Beebe. G. P. Putnam's Sons, New York. 1924. $7\frac{1}{2}$ " x $10\frac{1}{2}$ ". 82 figs, 8 colored plates, 443 pp. Price, \$9.00.

"The Galapagos Archipelago is a tiny group of about sixty islands and islets, directly on the equator, in the Pacific, five hundred miles off the coast of Ecuador, to which country they belong." This masterly sentence in the preface compresses the maximum of information into the minimum of space and orients the reader at once, preparing him for the treat which is to follow.

The book describes, in Mr. Beebe's entralling style, an expedition to the Galapagos and what was found there. We are given the background of black volcanic islands, walking impossible on account of the sliding blocks of lava and the thorny undergrowth, no fresh water. On this canvas Mr. Beebe paints a land belonging more to the age of reptiles than to the age of man. There is here no work of man, no cheerful cock-crow, no buzzing of the bee, no gentle rustling of soft green leaves; instead, unbelievable prehistoric lizards loom in the shade of the cactus and the sound that really "belongs" is the hiss of the reptile.

Instead of the teeming life of his British Guiana jungle the author here encounters a comparative paucity; the archipelago is so barren and desolate as to be practically a desert, and its natural history is correspondingly restricted. There lies Mr. Beebe's predilection; he would much rather scrape up a square yard of jungle floor and make an intensive study of the scrapings than to spread the same total effort over square miles of the same jungle. There are, probably, more learned scientists than Mr. Beebe but there are no better naturalists, if we use the latter term in its highest sense—lovers of Nature. There is, assuredly, no more interesting writer on the subject. No matter what he writes about, he fires us with a desire to go there and see it too. Perhaps that is one reason why "a new book by Beebe" is an event to be looked forward to.

Mr. Beebe can and does see full fledged dramas where the casual observer sees only a dried leaf. How many of us who have been stationed on the Canal Zone—how many of us who have hunted there, know anything about the Water Possum obtainable in the jungle back of "Sherman"? How many of us know that there is such a thing? Yet, it is one of the rarest of American animals and Beeb etells of hunting for it, en route to the Galapagos.

Upon arriving at the Archipelago, true to Beebeian philosophy they foreswore Albemarle Island with its 90-mile length and concentrated their efforts on some of the smaller islands. A dominant note was the tameness of the "wild-life". A mockingbird came up and "picked off a grain of wet sand from my shoe". While trying to pull a shell loose from a submerged rock, to the edification of an audience composed of four young seals, "again and again one would swim forward under water and nuzzle my fingers to find out what I was trying to do". Even the omnipresent big black sea-lizards, the only marine lizards in the world, could be stroked fearlessly down their four-foot length. The land lizards or iguanas, however, were found to be vicious until tamed by captivity. We are also told of flightless cormorants, elephant turtles, geckos,

fierce moray eels, the nesting of boobies and frigate birds, and of that natural clown, the penguin.

The book is not restricted to natural history. There is included the interesting Tale of the Ship-wrecked Taxi-driver and the Forgotten Box of Matches. One chapter is devoted to the meagre but intriguing history of the Archipelago; pirates, Robinson Crusoe, Captain Porter and all.

The press work of the book and the colored plates are excellent, the latter barely failing to show the iridescence of the fishes portrayed; the book is a valuable addition to any library and will be welcomed by Mr. Beebe's steadily growing circle of admirers.

The Dover Patrol, 1915-1917. By Admiral Sir Reginald Bacon, K. C. B., K. C. V. O., D. S. O. George H. Doran Company, New York. 2 Volumes, 716 pages, with maps and illustrations.

Admiral Bacon's graphic account of the manner in which the Dover Patrol carried its awful burden forms one of the most inspiring narratives that has arisen from the memories of the World War.

Most military and naval commanders leave to posterity a record of actions only. In "The Dover Patrol" one finds a detailed description not only of each operation, at the same time sufficient for the technical reader and comprehensible to the layman, but also of the mental processes of the admiral responsible for the operations. Admiral Bacon's strategical and tactical logic is as interesting as it is of value to the student of naval history and the art of warfare. His plans include both those actually carried out by the patrol and those considered for future operations as well as those which a British Navy in the position of the German Navy would have attempted. Certainly he has proved that the German naval forces were not possessed of that naval instinct so essential for the successful waging of warfare at sea. It is interesting to note how the repeated failure of the German naval authorities to seize their opportunities affected the entire conduct of the Dover Patrol. "Truly we all longed to change plans with him and play the game over again."

Certain chapters of "The Dover Patrol" should be digested by every Coast Artilleryman. The patrol was in continual contact with the German Forces ashore so that actions between the Coast Artillery and forces afloat are narrated from the Naval officer's viewpoint. In Chapter IV the coastal bombardments are described together with the various means adopted to obtain observation of fire. Those students who concede a battery or a set of locks to be out of action when a big gun ship comes within range would do well to consider this chapter most thoroughly. Admiral Bacon admits frankly, as all of his experience must admit, that the guns afloat are no match for those ashore. The Tirpitz battery always won the decision.

Of further interest to Coast Artillerymen are Chapters VIII and IX where proposed landings on hostile shores are described. Perhaps the most comprehensive landing operation devised is the "Great Landing" contemplated for the Belgian Coast in which a force of 13,750 men, with tanks, artillery, machine guns, Stokes mortars, etc., were to be landed simultaneously behind the German lines without recourse to small boats. One is carried along by the Admiral's enthusiasm and logic to a conclusion that the project would have succeeded. His attention to detail shown here is remarkable.

Artillerymen reading these volumes should note in particular the use to which smoke was applied in protecting the Patrol from German shore bat-

teries. All the fine theoretical observation of fire fell before this practical defense as used repeatedly both by the fleet and by the Tirpitz battery.

Admiral Bacon's book is of equal value as a text book or a novel. He writes in an easy, concise and at times humorous style that causes time to be forgotten as the reader lives with him again the stirring times with the Dover Patrol.

Manual of Military Training. By Moss & Lang. Geo. Banta Co., Menasha, Wis. 1923. $5\frac{1}{2}$ " x $7\frac{3}{4}$ ". 2 Volumes, 1825 pages. 842 Illustrations. Price \$2.50 for Vol. I and \$2.50 for Vol. II, total \$5.00.

In this third revised edition of the Manual of Military Training, Colonel Jas. A. Moss and Major John W. Lang have prepared a publication of exceedingly great value to the service, and especially to officers and non-commissioned officers on duty with R. O. T. C., C. M. T. C., and National Guard units. It covers, not only all the subjects prescribed by the War Department orders for R. O. T. C. Units of Infantry and for the Red, White and Blue C. M. T. C. courses, but it also contains additional material which broadens its scope to include the essentials of what every company commander should know. It is up to date, complete, authoritative and practical. It is sufficient to say that this work is well up to the standard, and even in some respects superior to, the previous Moss publications so familiar to the entire service.

Vol. I covers these subjects: Object and Advantages of Military Training, Military Courtesy, Discipline, Deportment and Appearance, Customs of the Service, Infantry Drill Regulations, Manuals of the Color, Band and Saber, Tent Pitching, Scouting and Patrolling, Covering Detachments, Physical Training, Rifle Marksmanship, Interior Guard Duty, Individual Infantry Equipment, Visual Signaling, Command and Leadership, Psychology and Leadership of the American Soldier, Training and Instruction, Musketry, Map Reading and Military Sketching, Bayonet, Automatic Rifle, Hand and Rifle Grenades, Military Hygiene, Individual Cooking, Marches, Camps and Camp Sanitation, First Aid, Sand Table Technique, Care and Preservation of Clothing and Equipment, Infantry organization, Games, Contests and Athletics.

Vol. II, contains further elaboration of, and advanced instructions in Infantry Drill Regulations, Interior Guard Duty covering Detachments, and marches. In addition it contains orders and instructions on the following subjects: Field Engineering and Fortifications, Roads, Bridging and Bridging Expeditants, Camouflage, Browning Machine Gun, One-Pounder Gun, Light Mortar, Military Law, Tactics, Military History and Policy of the U. S., Administration, Pistol Marksmanship, Rules of Land Warfare.

Mexico and Her People of Today. (New Revised Edition). By N. O. Winter. L. C. Page and Company, Boston, 1923. $5\frac{3}{4}$ " x $8\frac{1}{4}$ ". 536 pp. Maps and Illustrations. Price \$3.75.

This book gives, in comparatively few pages, a study of Mexico, past and present, its geographical, climatic, agricultural and industrial features. Its people, past and present, their characteristics, customs and accomplishments are interestingly described. The present day problems are discussed and a simple explanation of the Mexican's not-too-friendly attitude toward the United States is given. There are included many interesting photographic illustrations.

The author is well-informed on his subject, and takes the point of view of a friend of the Mexicans but does not let his sympathy lead him into overlooking their shortcomings. One finishes the book with a very good understanding

of the subject and a feeling that a few years of peace under a good government would allow a great development of the resources of Mexico and bring to her people that enjoyment, of prosperity and peace, which has been denied them so many years.

Your Washington and Mine. By Louise Payson Latimer. Charles Scribner's Sons. 8½" x 6". 382 pp. Illustrations. Price, \$2.50.

The author has given us a detailed account of the founding and development of our capital city. She has described clearly the public buildings, the parks, and the political relations between the United States and the District of Columbia. She has done this, too, not as a statistician but as an historian who sees not only the facts, but also the romance attendant upon them.

The book is full of delightful incidents of famous personages and places. To those who would know more of their National Capital we heartily recommend this book.

Field Engineering. By P. S. Bond. The New Military Library, Baltimore. 168 pages. Illustrated. Price \$1.50.

The first chapter is devoted to the general principles of defensive combat with some discussion of the classes and forms of defensive action and the conduct of the defense.

The general organization of a defensive position and the general principles of field fortification are discussed. The construction of trenches, obstacles, shelter, emplacements and camouflage is taken up in great detail as to types and methods of construction, with good illustrative drawings. But so much detail is rather confusing to the average officer in search of that information, on a few standard types and method of construction, which allow him to intelligently start to work in the field without loss of time.

It is a good reference book for data on construction of various defensive works.

Siberia's Untouched Treasure. Its Future Role in the World. By Fairfax Channing. With 82 illustrations and 15 maps. G. P. Putnam's Sons. 6½" x 9¼". 475 pp. Price

For three hundred and seven pages, or the whole of Parts I and II, the reader wonders, "Why the title?" That does not mean, however, that one's interest lags. On the contrary the book is stimulating and profitable reading, in spite of the fact that one's conclusions cannot agree at all times with those of the author.

Mr. Channing devotes Part I to an idealistic discussion of America's place in international affairs. Part II is a realistic account of the A. E. F. in Siberia, in which expedition Mr. Channing served with distinguished gallantry as an Army officer, winning the D. S. C. The ideals which he sets forth in Part I as the basis of American conduct seem to have been applied by our troops in Siberia with rather telling effect. The intricate relations existing among Bolsheviks, Cossacks, Japanese and Americans are discussed and many exciting incidents related.

Part III deals with Siberia—its present state and its future as regards its mines, its timber, its manufactures, its agriculture, its fisheries and its furs. One is startled by the facts presented, one of which is indisputable; that here is one of the last great unexploited areas of the world. We are concerned, with the author, as to the attitude of the United States toward its development.

INDEX TO CURRENT ARTILLERY LITERATURE

For period ending December 31, 1924

KEY

<i>AR-1</i>	Boletin de Centro Naval.	<i>UK-21</i>	Royal Engineers Journal
<i>Be-4</i>	Bulletin Belge des Sciences Militaires	<i>US-3L</i>	American Journal of International Law
<i>C-1</i>	Memorial del Ejercito de Chile	<i>US-7.5</i>	Army Ordnance
<i>F-10</i>	Revue d'Artillerie	<i>US-16.5</i>	Chemical Warfare
<i>F-12</i>	Revue Militaire Generale	<i>US-17D</i>	Century
<i>I-4</i>	Revista Maritima	<i>US-20.5L</i>	Current History
<i>M-2</i>	Rivista del Ejercito y Marina	<i>US-27</i>	Field Artillery Journal
<i>Sn-2</i>	Svensk Kustartillerie-Tidsskrift	<i>US-28</i>	Flying
<i>Sp-2</i>	Memorial de Artilleria	<i>US-30</i>	Infantry Journal
<i>UK-2</i>	Army Quarterly	<i>US-40.5L</i>	Literary Digest
<i>UK-11</i>	Journal of the Royal Artillery	<i>US-41</i>	Military Engineer
<i>UK-13</i>	Journal of the United Royal Service Institute	<i>US-43</i>	Military Journal
<i>UK-14</i>	Journal of the Royal United Service Institute of India	<i>US-46.5L</i>	Outlook
		<i>US-59</i>	Proceedings of U. S. Naval Institu-

ANTIAIRCRAFT DEFENSE

- Antiaircraft Artillery, its Capabilities and its Limitations.—*UK-11*, December 1923.
Antiaircraft Doctrine.—*US-38*, November, 1924.
Antiaircraft Ground Defences.—*UK-2*, April, 1924.
Deflections in Anti-aircraft Firing.—*UK-11*, October, 1924.
An Emergency Method of Fire Control for Antiaircraft Artillery.—*UK-21*, December, 1923.
Shooting with Antiaircraft Guns.—*UK-11*, February, 1924.
L'Artillerie Antiaerienne Allemande.—*F-10*, November, 15, 1923.
La Defense Terrestre Contre Objectifs Aeriens.—*Be-4*, January, 1924.

AMMUNITION

- Artillery Ammunition.—*US-7.5*, November-December, 1923.
Malfunctioning of Ammunition.—*US-7.5*, January-February, 1924.

AVIATION

- Bombarded Aereo.—*Ar-1*, November-December, 1923.
The Laws of War Concerning Aviation and Radio.—*US-3L*, October, 1923.
The Navy's First Airship *DN-1*.—*US-78*, May, 1924.
Proposed Rules for the Regulation of Aerial Warfare.—*US-3L*, January, 1924.
Recent Developments in the Navigation of the Air.—*US-59*, January, 1924.
Tactical Employment of Naval Aircraft.—*UK-11*, December 1923.
World Flight Progress.—*US-78*, May, 1924.
Night-Flying Equipment and Operation.—*US-33*, May, 1924.
The Proposal for a United Air Service.—*US-59*, September, 1924.
Battleships Versus Aircraft.—*UK-8*, October 10, 1924.
Seagoing aircraft.—*US-59*, November, 1924.
The United States Air Policy.—*US-20.5L*, November, 1924.
A Seven-Day Journal.—*UK-8*, October 31, 1924.

BALLISTICS

- The Aberdeen Chronograph.—*US-7.5*, January-February, 1924.
Essai De Balistique Aerienne.—*F-10*, November 15, 1923.
Perturbations Dans Le Tir Des Bouches a Feu De Cros Calibre.—*F-10*, March 15, 1924.

A Camera for Studying Projectiles in Flight.—*US-36*, June, 1924.

BOMBS AND BOMBING

- Bombs and Bombing.—*US-33*, June, 1924.
Bombs, Part I.—*US-7.5*, January-February, 1924.

INDEX TO CURRENT ARTILLERY LITERATURE

Bombing Tests on the "Virginia" and "New Jersey."—*US-59*, December, 1921.
Essai De Balistique Aerienne.—*F-10*, November 15, 1923.

CHEMISTRY

Benzol and Toluol for the Next War.—*US-7.5*, November-December, 1923.
Nitrogen Fixation.—*US-59*, May, 1921.
The Synthetic Ammonia Process of Nitrogen Fixation.—*US-7.5*, November-December, 1923.

CHEMICAL WARFARE

Chemical Warfare and the Engineers.—*US-11*, March-April, 1921.
Necessity for Defense Against Chemical Warfare as Shown by World War Reports.—*US-7.5*, January 15, 1921.
New Gas Mask Proves to be no Handicap in Firing.—*U.S.-16.5*, December 15, 1921.
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